MISSOURI FOREST LEGACY PROGRAM

ASSESSMENT OF NEED

FINAL REPORT
May, 2005

STATEMENT OF PURPOSE

Forests cover about one-third of Missouri and eighty-three percent of these forests are privately owned. It has been estimated that the average tract of land in Missouri changes hands every seven years. Missouri is generally a rural state with comparatively low land prices outside of a few metropolitan areas. Recent increases in land and timber values have increased the amount of land speculation and conversion not only in the metropolitan areas and the wildland-urban interface, but also throughout rural, forested portions of the state. The Ozark Highlands of southern Missouri include important forests for neo-tropical migrant birds and many other avian and terrestrial species. This "wood basket" is also very important to the many small, family-owned businesses that charactorize the wood industry in the state. Many rural Missouri communities are very dependent on forests and forest products for their survival. Forest-based recreation is also becoming an important industry in Missouri. Protection and management of Missouri's forests is becoming more critical as our population grows.

The Governor of Missouri appointed the Missouri Department of Conservation as the state lead agency to develop and administer a Forest Legacy Program in Missouri. The purpose of a Forest Legacy Program is to identify and protect environmentally important forest land from conversion to non-forest uses, primarily through the use of conservation easements.

Guidelines for the Forest Legacy Program (FLP) require the state lead agency to prepare an Assessment of Need (AON) to establish a state Forest Legacy Program in consultation with the State Forest Stewardship Coordinating Committee, (SFSCC). In 2002, the Missouri SFSCC recommended that the Forestry Division develop an AON and elected to exercise the State Grant Option. This was later acknowledged and reaffirmed by the Conservation Commission in January, 2004. Under the State Grant Option, all FLP acquisitions shall be transacted by the state with title vested in the state. Landowner participation is entirely voluntary.

The SFSCC developed a list of criteria to identify important forest areas, traditional forest uses and high conversion pressure. Spatial analysis of these criteria identified four forest areas with important forest areas and high conversion pressure. The Missouri FLP provides landowners an opportunity to protect valuable forest resources while retaining ownership of the land. The protection afforded by the FLP will enable landowners to maintain and manage their forest resources and pass them on to future generations. As these resources are protected, many traditional values and uses of our forest land will continue to be available through time. The AON for Missouri represents Missouri's commitment to the protection of one of our most valuable and valued resources, our forests.

As appropriate, periodic review and revision of this assessment will be made to meet future needs of the citizens of the state of Missouri

JOHN D. HOSKINS, Director Missouri Department of Conservation	ROBERT L. KREPPS, State Forester Missouri Department of Conservation

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ACKNOWLEDGMENTS

The Missouri Forest Stewardship Coordinating Committee would like to recognize the following individuals for their assistance in the development of the Forest Legacy Assessment of Need:

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EXECUTIVE SUMMARY

Missouri is a state that has traditionally been rural in character, dominated by many small communities interspersed among farmland and rolling forested hills. Based on current trends, however, Missouri's population growth is increasing at an alarming rate in rural and "open space" areas, with a total of 435,400 acres or 680 square miles of fields, farmland, forestland and other "green space" converted to urban use between 1982 and 1997. This represents a 35 percent increase in the expanse of the state's urbanized area even though the state's population grew just 9.7 percent during that same period. Even more alarming is the fact that more land was developed in the five years between 1992 and 1997 than over the preceding 10 years. (The Brookings Institution, 2002). This conversion of rural land to urban land has had negative impacts on forest resources, watersheds and water quality, and the rural character of Missouri life. Indications are that this trend will continue to increase into the future.

It is becoming increasingly important to address this unprecedented land conversion not only in traditional urban and metropolitan areas, but also in rural areas if Missouri is to retain some of its scenic beauty, rural character, quality of life and traditional economic base. Public land acquisition can only address a small amount of this conversion. Since 83 percent of Missouri forest land is privately owned, it is important that programs such as the Forest Legacy Program are available to assist landowners in protecting their land from conversion by providing a viable economic option that will also help to support local the economy. Although this conversion pressure is being felt throughout the state, it is important to focus the efforts of the Forest Legacy Program on the areas with the greatest combination of conversion threats and forest values along with a history of traditional uses tied to those forested lands. Defining those threats, forest values and traditional uses to determine priority areas for the implementation of the Forest Legacy Program is the purpose of this Assessment of Need.

This Assessment of Need (AON) was completed by the Forestry Division of the Missouri Department of Conservation under the guidance and direction of the Missouri Forest Legacy Committee. This committee was appointed by the Missouri State Forest Stewardship Coordinating Committee (SFSCC). The Missouri SFSCC will approve the final AON and assist the State Forester in the implementation of the FLP in Missouri.

The goal of Missouri's Forest Legacy Program is: To maintain large blocks of important privately-owned forest land that will supply the infrastructure to protect and conserve the important forest values for which the forest was selected. These values are critical watersheds and water supply protection, species richness, native forest ecosystems, karst features, and species of conservation concern. Protection will be in accordance with providing for economic viability and stability, forest stewardship and sustainability through the promotion of working forests.

This goal was developed by the Forest Legacy Committee and approved by the SFSCC to provide guidance in identifying the following criteria to address program goals in the selection of Forest Legacy Areas. A spatial analysis of the selected and approved criteria was completed to identify proposed FLA's in Missouri. Program goals were then used to define goals within each proposed FLA based on the importance of individual criteria in each of the four respective FLA's.

This AON included a two-part public participation process that reviewed program goals, selected criteria and the relative importance of each in identifying Forest Legacy Areas, and provided input on the designation of proposed FLA's.

The Missouri FLP AON identified four areas to be proposed as Forest Legacy Areas in the state. Each proposed FLA has unique forest values, traditions and conversion threats that are discussed in detail in this AON.

Also included in this AON are the application and evaluation packages for tracts to be considered for participation in the FLP.

Missouri elected to take the state grant option, so the Missouri Department of Conservation (State Lead Agency for the FLP in Missouri) will administer the program and hold all conservation easements acquired under the program. The State Forest Stewardship Coordinating Committee will advise the Missouri Department of Conservation in the implementation of the program, evaluate and rank proposed tracts, and assist with program coordination and implementation as required.

INTRODUCTION

Missouri is one of America's great forested states, ranking seventh of the 20 northeastern states in the amount of forest land. Forests cover about a third of the state – forests containing some of the finest oak, walnut, pine, and redcedar found anywhere.

Forests are Missouri's greatest renewable resource, providing many economic, environmental, and social benefits. They protect hillsides from erosion, keeping streams and rivers clean. They filter the air, soften the extremes of the weather, and add beauty to cities and towns. Much of Missouri's recreation and tourism industry is centered in the forested regions of the state. And forests are a diverse resource of plants, animals, birds, and other life forms.

Forest products are also important to Missouri. Harvesting and processing trees into wood products gives thousands of people jobs and contributes over $3 billion annually to Missouri's economy.

The Missouri Department of Conservation, the U.S. Forest Service, the National Park Service, the US Corps of Engineers, the Missouri Department of Natural Resources, and all other public agencies own approximately 2.7 million acres of Missouri's forest land. Approximately 307,000 private landowners own the majority of Missouri's forest land, 12.3 million acres (82%). (Birch, 1996)

Prompted by concerns that land development and consumption continues to seriously break up the forest land ownership nationwide, the United States Congress established the Forest Legacy Program (FLP) as part of the Food, Agriculture, Conservation, and Trade Act of 1990 (P.L. 101-624: 104 stat. 3359) to promote long-term integrity of forest lands. The program's purpose is to identify and protect environmentally important privately-owned forest lands threatened by conversion to non-forest uses through the purchase of conservation easements and fee-simple acquisitions. Through the Federal Agricultural Improvement and Reform Act of 1996 (P.L. 104-127: stat. 888), the Secretary of Agriculture is authorized at the request of the state to make a grant to the state to carry out the FLP in the state, including the acquisition by the state of lands and interests in lands. Missouri has requested this option.

This Assessment of Need (AON) for Missouri evaluates the potential need and use of this program in Missouri; identifies important forest areas; determines eligibility criteria for areas to be considered for the program within the state; identifies and delineates the boundaries of forest areas meeting the eligibility criteria; recommends these areas for inclusion in the Forest Legacy Program to the Forest Service and the Secretary of Agriculture; and sets specific conservation goals and objectives for this program in Missouri.

Identifying the state's forest land that best meets the eligibility criteria is a multiple-step process, including assessment of the important forest resource values, assessment of the threats for conversion, and determination of where these areas coincide. The important natural resource values to be assessed in this evaluation are: forest resources including aesthetic and scenic values; fish and wildlife habitat; mineral resources; public recreation opportunities; soil productivity; forest products and management opportunities; water values including water quality protection; the present and future threat of conversion of forest areas to non-forest uses; historic and

projected forest uses; current ownership patterns and tract size; cultural resources; outstanding geological features; threatened and endangered species; and protected land in Missouri. The threat of conversion will be assessed from a people pressure perspective, and includes indicators of population density and growth. Much of this evaluation was completed in GIS utilizing the criteria developed by the Missouri Forest Legacy Committee with public input used to weight each individual data set. This Assessment of Need documents the evaluation, assessment, and recommendations for a Forest Legacy Program and Forest Legacy Areas in Missouri.

MISSOURI FOREST RESOURCES

A. Historical Perspective

Early explorers of the Missouri territory found a blend of landscapes rich with the essentials of frontier life – wood, water, and wildlife. Forests covered 70 percent of the state with an astonishing variety of tree species. Explorers wrote of the dark swamps of the Bootheel, the park-like pine forests of the Ozarks, the balds of Southwest Missouri, and the mix of prairie and forest in north and west Missouri.

This diverse mix of habitat was home to many kinds of wildlife. Early journals tell of herds of buffalo, elk, and deer. Bear, wild turkey, passenger pigeon, and grouse were also common.

Settlers moved up the major rivers first. Until this point, they cut the timber and floated it back downstream to the larger towns. Cords of fuelwood supplied steam-driven riverboats. By the mid-1800s, settlers had cut the forests in the Osage and Gasconade River valleys. In the eastern Ozarks, the forests around Potosi and St. James had been logged off and made into charcoal to fire the local iron and lead smelters.

In the post-Civil War years, a war-torn nation needed lumber to rebuild. Railroad ties were in demand to complete the transcontinental railroad. Until then the great pine forests of the Ozarks were largely untouched because of their remoteness and lack of access. But eastern businessmen saw a valuable resource waiting for exploitation. The lumbermen bought up large tracts of forest land in the Missouri Ozarks. In 1887, the Missouri Lumber and Mining Company shipped a sawmill by rail to the end of the line in Williamsville. It was then hauled by wagon to Grandin in Carter County. This mill would eventually become one of the largest sawmills in the nation at that time. Other large sawmills operated in Winona, West Eminence, Bunker, Leeper, Greenville, Poplar Bluff, Doniphan and Birch Tree. The far reaches of the hollows sheltered hundreds of other small sawmills. At the turn of the 20th century, the Ozarks was one of the largest timber-producing regions in the nation.

Workers laid hundreds of miles of rails for narrow-gauge railroads to pull carloads of pine logs back to the mills. The mill at Grandin needed the logs from 70 acres of forest each day to keep it running. The rivers were also used for transportation. Large log drives were made on the Current, Jacks Fork, and Black Rivers. Farmers could make a little money by "hacking" or chopping railroad ties out of logs – a lot of work for the grand sum of 10¢ for the labor to hack a tie.

J.B. White was one of the principals of the Missouri Lumber and Mining Company in Grandin. Although White had made a fortune from logging, he was also a conservation-minded individual

and recognized that logging could be compatible with forest management. In April 1910, he, along with other early forest conservationists, invited U.S. Forest Service Chief Gifford Pinchot to Missouri. They hosted Pinchot on a tour of the cut-over forests in the Ozarks. White urged Pinchot to establish a national forest in Missouri in the interest of forest conservation.

By 1920, the forests that no one thought would run out, did. The huge mills shut down and the mill workers were left to eke out a living in the rocky, barren hills. They cleared the ridgetops, trying to grow a few crops. Free-ranging livestock roamed the woods to forage on acorns and sprouts. Settlers burned the cut- over woods each spring, mistakenly believing that fire killed the ticks and snakes.

It was not until 1928 that Missouri's depleted forests received any official attention. That year, the Missouri General Assembly authorized a Department of Forestry under the Board of Agriculture. The Board appointed Frederick Dunlap as State Forester and hired Paul Dunn as a District Forester. Dunn moved to Ellington, where his primary job was fire prevention. He once reported that at least three-fourths of the land outside the state parks burned off twice each year.

Dunn drove around his district in a Model T, hauling a trailer with a movie projector and generator. He had one film, "Trees of Righteousness", apparently made by the U.S. Forest Service in Arkansas. Dunn wore out five prints of it showing it to every school district in Reynolds and adjoining counties.

In 1931, the Governor vetoed the forestry appropriation due to the Depression economy and the Forestry Department was abolished due to lack of funding. Following six years of failure and the abolition of the Forestry Department, State Forester Dunlap concluded that it was impossible to stop forest fires in the Ozarks.

By the mid-1930s, Missouri's forest and wildlife resources were at an all-time low. The forests were burned and abused. Gravel, eroded from the hillsides, choked the once-clear streams. An estimated 2,000 deer remained in the entire state, and turkeys declined to a few thousand birds in scattered flocks.

In 1929, the Missouri National Forest Association successfully lobbied the Legislature to permit the federal government to purchase land in Missouri for a national forest. Eight purchase units were set up in 1934-35, and the national forests became a reality. Eventually 1.5 million acres of cut-over forest land was acquired – the land that nobody else wanted.

Conservation efforts were also underway on the state level. Voters approved the constitutional amendment creating the Conservation Commission in 1936. This new agency included a forestry division; an innovative idea at a time when most other fish and wildlife agencies were separate from forestry departments. The early Missouri conservationists recognized that a healthy forest resource was essential to healthy fish and wildlife populations.

The Conservation Commission hired former Forest Service employee George O. White as State Forester in 1938. Fire control was his first big job. Borrowing an idea from Paul Dunn, the "Showboat" was put into operation to educate the rural folks not to burn. This was a truck with a

generator, picture screen and projector, and operator. It took forestry movies into the Ozark hills where there was no electricity. The pictures were shown outdoors, in crossroad stores, at country churches and schools. The "Showboat" brought movies to people who had never seen one in their lives. This mobile entertainment operated for 12 years, continuing even through World War II.

Gradually, fire prevention programs began to pay off. Once fires were reduced, efforts could be turned to managing the forest. Foresters planted seedlings, harvested trees damaged by fire, and removed undesirable trees. Conservation Commission employees worked with landowners to teach them how to improve their forest and wildlife habitat.

Tremendous progress in Missouri's forest management has been made in the last half century. The once-impossible task of fire control in the Ozarks is a reality. Today less than one-tenth of one percent of Missouri burns each year. Deer and turkey are found in record numbers. Restoration programs have reintroduced ruffed grouse and river otters. The forest is again healthy, and once again, Missouri is a leader in wood products.

Conservation, wise use, has made all this possible. The recovery has been so remarkable that some areas are now called "wilderness." Older foresters just smile and think back to all the years of fire fighting and management that helped create that "wilderness."

Missouri's forest and wildlife resources have made a remarkable recovery from the ravages of the early 20th century. Forest fire control, harvesting of defective trees, and reforestation have all resulted in the quality forest Missourians now enjoy. Today, nearly 14.6 million acres of the state are covered with forests, a gain of nearly two million forested acres in the last 30 years. (Moser et al., 2004)

NOTE: For a more in-depth discussion of this subject, see "Missouri Forests, Their History, Values and Management" by B. Palmer, 1991. Missouri Department of Conservation, Jefferson City, MO.

B. Ownership Patterns of Missouri Forests

Three groups own the commercial forest land in Missouri -- the federal government, state and local governments, and private landowners.

Federal and state governments own only 17 percent of the forest land in Missouri or about 2.7 million acres. The U.S. Forest Service owns the 1.5 million acre Mark Twain National Forest, the largest federal forest in the state, and the Department of Conservation is the largest owner of State forest land with about 600,000 acres of forest land. Other government ownerships include the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, the National Park Service, the Missouri Department of Natural Resources, and the University of Missouri. The single largest private forest owner in the state is Leo Drey who owns the 150,000 acre Pioneer Forest. Most of this land was recently transferred to the Leo A. Drey (L-A-D) Foundation but will continue under forest management by the Pioneer Forest staff. The second largest industrial ownership in Missouri is approximately 26,000 acres owned by Jon Smith of Smith Flooring although this land is not currently managed for wood production. The 17,000 acre Powell Lumber lands were

recently sold to the Current River Pole Company and will be systematically harvested and managed for pine and hardwood production. The MeadWestvaco Company owns less than 4,000 acres in the Missouri bootheel (including the 600 acre fiber farm), but has been divesting itself of much of its landholdings.

According to the publication, "Missouri's Forest Resources in 2001", Missouri's forest land comprises approximately 14.6 million acres, or 33% of the state's 44 million acres. Of the total forest land, 14.3 million acres are classified as timberland, capable of producing 20 cubic feet per acre per year of wood product. About 83 percent of the forest land is privately owned. The remaining forest land is publicly owned by state, federal, or municipal governments. (Table 1)

Table 1 Area of Timberland by Ownership Class (2000)

Ownership	**Acres (1,000 acres)**	**Percent**
Private Ownership	12,199.0	83.5
National Forest	1,378.2	9.4
US F&W Service	19.2	<1
Dept. of Defense	40.5	<1
Other Federal	281.9	1.9
State	661.8	4.5
County & Municipal	33.9	<1
Total	**14,615.4**	**100**

Most public forest lands are managed under the "multiple-use" concept. Timber production is balanced with other amenities and uses derived from, or associated with, forests to meet a myriad of social and environmental objectives. Through multiple use management, benefits such as watershed protection, wildlife habitat, recreation, and timber can all be supplied by the same forest.

National and state forests are managed quite differently from national and state parks. Forests are managed for the wise use of all resources. Activities may include timber harvesting, hunting, hiking trail construction, and wildlife habitat improvement. National and state parks are managed primarily for their cultural, historical, or recreational value. Management of natural resources such as forests and wildlife is not a part of their mission, although they may carry out conservation practices in some areas.

According to Thomas Birch (1996), there are 307,000 private owners of forest land in Missouri. These private landowners own 83 percent of Missouri's forest land. Part of the challenge of forestry is helping private landowners apply management practices to create and maintain the kind of forest that meets their needs.

Private landowners have many different reasons for owning forest land and many different expectations from that land. Some want to encourage game animals, others like to bird watch. Many buy forest land for recreation -- a place to get away from the office and telephone. Others see a long-term investment in the land and timber. Whatever the reason for owning forest land, a well-managed forest can complement most other uses of the land.

Private forest land is very important as a resource base for Missouri's wood industries. As society places more demands on public land for non-timber values, industry will have to depend more heavily on private land for its raw materials. The FLP can be very important in helping to maintain existing privately owned forest land in a managed condition. The wood products available from these lands can help to provide for a viable forest industry in southern Missouri. Healthy, sustainably managed forests provide raw materials needed to maintain forest industry and a viable forest industry provides greater economic opportunities for forest landowners to maintain their land in forest rather than convert or sell the land. This symbiotic relationship is critical in much of southern Missouri and will be an important consideration for FLP participation in that portion of the state.

Managing forest land is an undertaking that may span several generations of a family. Most landowners want to leave their land better than they received it. They realize that forest management is an investment in the future. Several programs have been developed to help private landowners with the long-term stewardship of their property.

Department of Conservation foresters offer many services free of charge. They can advise landowners on all phases of forest management advice such as tree planting, thinning, and harvesting; wildlife habitat development; and pest control. Private consulting foresters are also available for a fee to landowners who need these services on a continuing basis. They can provide the full spectrum of management assistance as well as timber appraisals, establishment of cost basis for taxes, represent landowners for tax or litigation related to forest resources, and contract for the completion of cultural work. These services all support forest stewardship and are important to the success of the FLP in Missouri.

Federal programs are also available to provide financial assistance for the completion of forest management work. A variety of forestry practices are eligible for cost-share assistance through EQIP, WHIP, and CRP in addition to the new Forest Land Enhancement Program (FLEP). In addition, state funds are available for forestry cost-shares. Forest areas identified as focus areas for these programs will provide additional guidance for the implementation of the FLP in Missouri

C. Forest Distribution and Composition

Missouri lies on the western edge of the Central Hardwood Region. This region covers about 100 million acres, stretching from Missouri to Pennsylvania and from Tennessee to the Lake States. The forests of the Central Hardwood Region contain more than 70 deciduous tree species, several evergreens, many shrubs and forest plants, and a variety of wildlife species.

Forest cover was historically and is currently heaviest south of the Missouri River and particularly in the southeast Missouri Ozarks. Oak-hickory forest types dominate in the Ozarks and forest industry is heavily reliant on oak species. Missouri is one of the leading producers of oak flooring, wooden pallets, charcoal, oak barrels, walnut products and cedar novelties. (Leatherberry and Treiman, 2002)

Forest distribution is important particularly in the Ozark Highlands Region of Missouri because this is the largest contiguous block of the oak-hickory forest type in North America. It provides important breeding habitat for many species of neo-tropical migrant birds. These forests are also important in terms of micro-climate influences, air quality, protection of many important watersheds, fish and wildlife habitat, outdoor recreation, and in supporting Missouri's wood industry and thereby, the economy of many small Missouri communities. Maintaining the contiguous forest cover in the Missouri Ozarks is an important objective of the FLP in Missouri for the biological, social and economic benefits provided by these forests.

Since Missouri lies at the crossroads of several major Ecoregions, many unique natural forest communities are found here. Plants and animals more common to other geographic regions of North America are often intermingled here, providing for high species diversity as well as many unique and endemic species. The Missouri Ozarks are relatively steep with thin soils, so forests are critical for soil and water protection as well as for the abundant wildlife they support. They are key to providing quality outdoor recreation opportunities and important local "economic engines" with the "Mom & Pop" forest products industry that is present in the Ozarks. The Forest Legacy Program will complement existing forest management and landowner assistance programs that currently promote forest stewardship in this area.

Four broad forest types, often called associations, occur in Missouri. The four types and the species found in each type are:

1. Oak-Hickory - This upland association accounts for 10.7 million acres (71%) of the forests in Missouri. (Leatherberry, Treiman, 2002) Oaks dominate, with white, black, scarlet, and northern red oak being the most common. Post and blackjack oak occur often on drier areas. Less common are southern red, chinkapin, bur, and pin oak. Hickory is a minor but consistent part of the association. Other important overstory species are blackgum, red and sugar maple, ash, elm, black walnut, and redcedar. Many understory species occur in oak-hickory forests. The most common are flowering dogwood, sassafras, redbud, serviceberry, eastern hophornbeam, and American hornbeam. Most of Missouri's forest products industry is dependent on oak species (Palmer, 1991). There are many variations of this broad forest type that are found throughout Missouri. These vary by the presence and amount of particular oak species and the species and amount of associated tree species and other vegetation. Each one has unique characteristics and values but all are important for wood products, recreation, soil and water protection, fish and wildlife habitat and other social and cultural values that are all important criteria for the establishment of Forest Legacy Areas in Missouri. More detailed descriptions of local forest types are found in the descriptions of the proposed Forest Legacy Areas.

2. Oak-Pine - This upland type occurs on the drier sites in the southern and southeastern Ozarks. It is very similar to the oak-hickory type except that shortleaf pine makes up 25 to 50 percent of the stand. The remainder is primarily oak, but other hardwoods associated with oak-hickory may also be present. Shortleaf pine was once more common in southern Missouri, but was extensively logged in the late nineteenth and early twentieth century to fuel the industrial revolution. It was replaced by the more aggressively sprouting oaks on many sites. (Palmer, 1991)

Conifer forest types, including shortleaf pine and eastern red cedar, occupy about 4 percent of the State's land area. However, conifers make up a significant portion of some hardwood types because 7 percent (1.1 million acres) of the forest land area is classified as the oak-pine type. (Leatherberry and Treiman, 2002).

Pine and oak-pine forests are important natural communities in Missouri. The amount and extent of pine has been greatly reduced over the past century so restoration is important in maintaining many unique forest natural communities, for cultural and aesthetic reasons and for supporting a viable and diverse wood products industry in Missouri. Since shortleaf pine occurs on the northern edge of it's natural range in Missouri, conservation of the unique genetics of naturally occurring shortleaf pine was identified as an important criteria for identifying important forest area's in Missouri. The presence of native pine stands and established shortleaf pine forests will be important considerations when evaluating proposed tracts within the native shortleaf pine range of Missouri.

3. Mixed Hardwoods - This association appears in one small area known as Crowley's Ridge in southeast Missouri. Mixed hardwood forests are a remnant from the geologic period when the Ozarks and Appalachians were one mountain chain. The principal species are yellow-poplar, sweetgum, white oak, northern red oak, American beech, and sugar maple. Black oak, scarlet oak, and cherrybark oak, white ash, red maple, and blackgum occur frequently, and hickory is usually present. Other species found in the mixture include basswood, buckeye, cucumbertree, black cherry, walnut, and butternut. Understory species include flowering dogwood, redbud, American holly, hazel-alder, serviceberry, American hazel, and American hornbeam. (Palmer, 1991). This forest type is limited in Missouri and will be a consideration for the evaluation of possible FLP easements in the extreme southeastern portions of Missouri.

4. Bottomland Hardwoods - This type occurs on the flood plains adjacent to rivers and streams, and in the B0ootheel of southeast Missouri. The land it occupies may be covered with standing water for long periods, as in the swamps of the Bootheel, or it may be subject to only short periods of flooding. Here, a great number of plant species make up the forest. Important species in river flood plains include pin and bur oak, cottonwood, elm, ash, willow, river birch, silver maple, sycamore, hackberry, sugarberry, pecan, and sweetgum. In addition, baldcypress, water tupelo, and Nuttall, willow, cherrybark, overcup, swamp chestnut, and water oak are native to the swamps of the Bootheel. (Palmer, 1991)

Elm-ash-cottonwood types represent 10 percent and Maple-beech-birch types represent 7 percent of the forest land area in Missouri, respectively. (Leatherberry and Treiman, 2002). Bottomland hardwoods forests are critical for stream bank stabilization, water quality protection, fish and wildlife habitat and to a lesser degree, forest industry in Missouri. Restoration, management and protection of bottomland and riparian forests are important objectives for the FLP particularly in the big river systems and in northern and western Missouri.

Table 2 shows the major forest type groups found in Missouri and the relative abundance.

Table 2 – Area of timberland by forest type group and stand-size class, 1999-2003*
(In Thousand Acres)

Forest Type Group	All Stands	Sawtimber	Poletimber	Sapling-Seedling	Non-Stocked
Softwood type groups					
White/red/jack pine group	1.5	1.5			
Loblolly/shortleaf pine group	154.1	104.3	46.2	3.6	
Pinyon/juniper group	443.9	84.4	221.8	137.8	
All softwood types	**601.0**	**191.7**	**268.0**	**141.3**	
Hardwood Type Group					
Oak/pine group	972.0	385.1	444.8	142.2	
Oak/hickory group	11,126.5	5,865.9	4,247.7	1,012.9	
Oak/gum/cypress group	65.0	47.7	18.2		
Elm/ash/cottonwood group	913.1	564.9	244.7	103.6	
Maple/beech/birch group	309.6	114.8	114.4	80.5	
All hardwood types	**13,388.6**	**6,979.6**	**5,069.8**	**1,339.2**	
Non-Stocked	94.5				94.5
All Forest Types	**14,084.2**	**7,171.3**	**5,337.8**	**1,480.6**	**94.5**

Source: Missouri's Forest Resources in 2003; Moser, WK, Treiman, T., Moltzan, B, Lawrence, R, and Brand, G., 2004; Resource Bulletin – *in press*. USDA Forest Service

D. Fish and Wildlife Habitat

Missouri is home to about 730 species of wildlife, many of which live in the forest during a part of their life. Animals ranging from the white-tailed deer and wild turkey to the rare Ozark zigzag salamander are found in Missouri's forests. (Palmer, 1991). The Cerulean warbler is a species of concern that needs extensive mature bottomland hardwood forests that can be found along several major streams in the Ozarks. Ovenbird, black-and-white warbler, and screech owl are just a few of the many forest interior birds that inhabit the forests of the Missouri Ozarks. Large blocks of contiguous forest are important habitat for these forest-interior bird species.

Missouri's forests are important in providing wildlife habitat for many species. Many of these species are dependent on large blocks of contiguous forest cover, so it is important that efforts are directed at maintaining large blocks of forest by reducing parcelization and conversion of smaller tracts. This will help to ensure continuity of habitat and assure adequate amounts of forest land to provide for wildlife needs, especially the needs of game species and species of concern.

Active management of forest land will serve to maintain and improve wildlife habitat while providing for the traditional recreational and economic uses of these forested lands. The conservation of large blocks of forest land are an important element of the Forest Legacy Program in Missouri and will be used as criteria in identifying important forest areas and in evaluating proposed projects within approved Forest Legacy Areas. Active management is not only important in improving wildlife habitat, but also an element of the FLP, so landowner commitment to manage forest land will be used to evaluate and rank proposed FLP projects in Missouri.

Missouri has about 1,163,000 surface acres of water (2.6% of the total area of the state), comprised of 900 public lakes (24% of total surface acres), 486 miles of the Mississippi River and 553 miles of the Missouri River (22% combined), almost 16,000 miles of permanent streams (8%), over 39,000 miles of intermittent streams (3%), and about 500,000 private lakes (43%). (MDC Annual Report, 2003). These waters support rich and diverse aquatic communities, including over 200 species of fish, 32 species of crayfish, 65 species of mussels, and hundreds of other amphibians, insects and invertebrates. There are currently 23 State listed aquatic species of concern in Missouri.

Forests play a significant role in river, stream and lake ecology. Surface waters, both flowing and impounded are also important components of wildlife habitat. Many of the primary issues related to water quality and aquatic fauna are directly related to land cover and use in associated watersheds. Forests can help reduce or mitigate many water quality and supply issues such as sedimentation, non-point pollution, high temperatures, underground water flow recharge through springs and seeps, bank stabilization and in-stream habitat and structure. Forested watersheds are critical in terms of stream protection and in maintaining water quality. Increasing the percent of forest cover in a watershed, particularly in riparian areas, increases the benefits to the water body. Heavily forested watersheds in Missouri are associated with clear, gravel-bottomed streams, stable stream banks, sustained flows, less flooding, and higher species diversity than those in less forested watersheds. Forests are a key to protecting water quality as well as fish habitat. Since larger tracts of forests generally provide greater benefits, emphasis for the FLP in Missouri will be on the acquisition of conservation easements on larger tracts of contiguous forest particularly those associated with imperiled waters or those containing high species richness and/or aquatic species of concern.

Stream protection efforts in Missouri have been focused on bank stabilization, riparian buffers and reforestation, livestock exclusion and alternative water sources. Protection of existing riparian forests and reforestation of riparian corridors will be a consideration for participation in the Forest Legacy Program. Conservation of forest land will have a positive impact on water quality throughout the state, but emphasis will be placed on forest resources associated with the big river systems in Missouri, (Missouri and Mississippi Rivers), since they are so extensive, unique and valuable to Missouri. Protection of forested watersheds that provide dinking water and habitat for species or communities of concern will be used as criteria to identify important forest areas in Missouri.

E. Watershed Values and Water Quality Protection

Many aspects of the use and development of land affect the quality of rivers, streams and reservoirs. Forests protect watersheds by reducing or preventing soil erosion; reducing surface water flows; increasing ground water supplies and output; buffering sediments, chemicals and contaminants from entering water supplies; assisting in the control of flooding; help to cool water; and provide habitat.

Forest management impacts to water sources can be significantly reduced or eliminated with the use of Forestry Best Management Practices (BMP's). Missouri has established forestry BMP's for timber harvesting and road and trail construction that are required for all forest management

practices that are implemented on public lands and on private lands that receive management assistance from State forestry staff. BMP's are also required on all Stewardship properties so there should be no negative impacts created from forest management on tracts with FLP conservation easements. "Soil erosion does not result from forest cutting in itself, but from cultivation, using that term in a broad sense. The question of preventing such erosion or soil wash is altogether one of dispensing with cultivation or properly controlling it. The natural regrowth which follows the destruction of a forest is fully as effective in preventing erosion, and even in retaining runoff as the natural forest." Major Hiram Chittendon, U.S. Army Corps of Engineers (1909).

The Weeks Law of 1911 states that: "The Secretary of Agriculture is hereby authorized and directed to examine, locate, and purchase such forest land, cutover, or denuded lands within the watersheds of navigable streams as in his judgment may be necessary to the regulation of flow of navigable steams or for the production of timber." The Weeks Law led to the establishment of the eastern National Forests, primarily as a means to enhance water resources. It recognizes the important relationship between forests and water resource protection that has been more fully developed and understood in recent years. Conservation easements obtained through the FLP will serve to protect watersheds as well.

The average loss of water by surface runoff from a protected woodland at the Soil Conservation Experiment Station, Zanesville, Ohio, for a 6-year period was only 3.4 percent of the total rainfall. During the same period, the runoff loss on pasture was 15.2 percent and on cropland, 23.3 percent. Soil losses for the same period were 0.09 ton per acre from woodland, 0.8 ton per acre from pasture, and 133.6 tons per acre from cropland (Borst & Woodburn, 1941). Because base flow predominates in forested watersheds, sediment yield in forest streams ordinarily is very low, on the order of 0.05 to 0.10 ton per acre. Contrast that to the 1 to 5 tons per acre per year from farmland, accepted as tolerable in agriculture. (Patric, 1994). Since sedimentation is one of the greatest threats to water quality and fish habitat, it follows that efforts should focus on forest establishment, management and protection as an important consideration for protecting water quality in Missouri. This will be considered as criteria for establishing Forest Legacy Areas and in ranking tracts proposed for participation in the FLP.

Water quality is a perennial hot resource issue and is commonly selected as the most important environmental issue in Missouri. From the highly erosive loess soils of north Missouri to the steep, rocky soils of south Missouri, forests are a very important feature in reducing erosion and maintaining water quality.

The karst nature of Missouri makes the protection of ground water important since many small, rural communities rely on ground water for their water supplies. As development occurs and population moves from cities and towns to once rural areas, septic systems are increasing at a dramatic rate. Many are poorly designed or do not function properly, adding to the contamination of underground water supplies. Forested watersheds provide protection by stabilizing soil and filtering sediments and chemicals before surface waters enter into ground water. Many larger Missouri communities draw their water supplies from surface water in rivers and reservoirs. Forests also play a role in protecting the watersheds that feed these water bodies. The FLP can provide options for maintaining forest cover for watershed protection in Missouri.

Riparian, watershed and groundwater protection will be considerations for ranking proposed tracts within each FLA, particularly where important or imperiled watersheds are identified within the FLA.

F. Recreation

Forests are important to the millions of Missourians who hunt, hike, camp, enjoy scenery, watch birds, canoe, or photograph nature. The Department of Natural Resources controls over 3,600 developed campsites in Missouri's state parks. The Forest Service has another 500 campsites. For those who prefer a more primitive camping experience, most Department of Conservation and Forest Service land is open to camping.

Hikers and backpackers use hundreds of miles of trails in Missouri's forests. The Ozark Trail, when completed, will stretch over 500 miles through the Ozarks from St. Louis to Arkansas. Over 350 miles of the trail are open now. State parks offer 350 miles of hiking trails. Trails on Conservation Department and Forest Service lands add another 1,200 miles available to hikers. Horseback riders have over 1,000 miles of roads and trails on public land open for riding.

Wilderness Areas offer other opportunities to enjoy the forest. Congress has designated eight federal Wilderness Areas in Missouri, totaling 71,358 acres, on national forest land and national wildlife refuge land. Regulations prohibit management practices, vehicles and motorized equipment in these areas. Wilderness Areas offer the solitude and undisturbed experience that many forest users desire.

Because outdoor recreation opportunities are widely available on public lands in Missouri, recreational access to private land is not an important objective of the Forest Legacy Program or other landowner assistance programs in Missouri. However, it will be a consideration when evaluating proposed FLP projects, especially when private tracts can provide connections between public land opportunities or in areas where public recreational opportunities are limited.

G. Aesthetics & Scenic Resources

Missouri's scenic beauty is recognized through the designation of two National Scenic Riverways, eight federal wilderness areas, and nearly 60,000 acres of Natural Areas. Much of the tourism in Missouri is based on its natural scenic beauty, especially in the southern Missouri Ozarks which remains rural, dominated by small communities with populations of less than 1,000. The Missouri Ozarks include the oldest "mountains" in the country that were created from a series of geologic uplifts over 400 million years ago. They have eroded to form rounded knobs and peaks with deep valleys. A common expression in the Ozarks is: "Our hills ain't high, but our hollers sure are deep"

The St. Francois Mountains in the eastern portion of the Ozarks developed over igneous rock and include the highest elevations in Missouri as well as some of the most scenic rivers in the mid-west. Many scenic granite shut-ins are found in the St. Francois River. One and a half billion years ago, hot volcanic ash and gases spewed into the air, then cooled, forming igneous rock. Later, shallow seas covered the rock, depositing sedimentary rock. The land rose. The sea fell. The weather began tearing down the land, exposing the volcanic rock beneath it. Waters of the Black River became confined, or "shut-in," to a narrow channel. Water-borne sand and gravel cut

deeply even into this erosion-resistant rock, swirling, churning…carving potholes, chutes and spectacular canyon-like gorges.

Ozark rivers remain clear, gravel bottomed and pristine in less developed portions of the Ozarks. A substantial canoe rental industry thrives on the scenic beauty of the Missouri Ozarks. Forests are important in protecting soil from erosion and in filtering sediment chemicals and nutrients from surface and ground water. Maintaining forests will help assure that the scenic beauty of Missouri's geologic and water resources are protected.

There is a relatively high proportion of forested public lands in the Ozark Highlands. Due to the significant recreational opportunities and the aesthetic benefits associated with these lands, aesthetics and public access will not be important considerations for the identification of important forest areas, but will be used to rank tracts that are proposed for participation in the FLP, particularly where they provide connectivity to scenic vistas or corridors.

H. Natural Areas

Natural areas meet a critical need for certain plant and animal species by preserving or restoring critical and unique habitat that is essential for survival of certain species. Preserving, restoring and protecting natural areas can provide ecological values not found in other habitats, forest types, or ecological land types commonly found in the state. Many of Missouri's species of concern are found only or primarily in natural areas. The Missouri Natural Areas System protects unique animal, plant, aquatic communities and geologic sites.

Natural areas are found on Department of Conservation, Department of Natural Resources, U.S. Forest Service, Army Corps of Engineers, National Park Service, The Nature Conservancy, L-A-D Foundation, Missouri Prairie Foundation, Kansas City Parks and Recreation, University of Missouri and private lands. Natural areas are designated by the Missouri Natural Areas Committee for their importance or uniqueness. Management is directed toward protecting the unique feature of the natural area; for the most part, nature is allowed to take its course. Presently, 184 areas containing 59,832 acres are in the Natural Areas System. The presence of a Natural Area or unique natural features and connectivity of proposed FLP tracts to natural areas and other publicly owned or protected lands will be considerations when ranking these tracts.

I. Wood Industry and Economics

Missouri was a leader in lumber production at the turn of the century when the pine forests of the Ozarks were logged. Through forest protection and management, Missouri is once again a leader in wood products. (Palmer, 1991)

Railroad ties and lumber are still important products but the wood industry has become more diversified through product development and consumer demand. Everything from pallets to Christmas trees are products of Missouri's forests. Wood products include furniture and flooring lumber, oak and walnut veneer, tool handles, gunstocks, fence posts, furniture and cabinets. Missouri is a national leader in the production of charcoal, barrels, walnut nutmeats and shell products, oak flooring and redcedar gift items. (Palmer, 1991).

Red oaks were the most harvested species group in 2000, accounting for 49 percent of the total

industrial roundwood volume. White oaks at 26 percent, cottonwood at 5 percent, shortleaf pine and hickory both at 4 percent, were the other major species harvested. Only 7 percent of the industrial roundwood processed by Missouri mills consisted of softwood species. The production of sawlogs accounted for 88 percent of the total industrial roundwood produced in 2000. The production of pulpwood products was the second largest consumer of Missouri's industrial roundwood production with 7 percent of the total production. (Piva and Treiman, 2003)

Wood industries make an important contribution to Missouri's economy. For many communities in the Ozarks, wood products are the mainstay of the local economy. In 2000, Missouri had a total of 440 primary sawmills that processed a total of 675 million board feet of saw logs. The 14 counties of the Eastern Ozarks Unit have the largest concentration of wood-using mills in the state, (221 mills in 2000). (Piva and Treiman, 2003). Missouri's wood industry is responsible for over 10,000 jobs and contributes over $3 billion annually to Missouri's economy. The proximity of forest land to forest industry and wood-dependent local economies will be factors that help identify important forest areas.

MISSOURI FORESTS: RELATED RESOURCES

A. Topography, Geology and Soils: Missouri's Natural Divisions

Natural forces and events of the remote past have influenced Missouri's landscape in both stark and subtle ways. A student of Missouri's natural history might ask what north Missouri would be like if the great ice sheets had not crunched and scraped their way over that part of the state 500,000 years ago or what the Ozarks would be like if they had not been exposed to erosion for hundreds of millions of years.

The Natural Divisions of Missouri is a map which divides the state into major regions based on geologic history, soils, topography, plant and animal distribution, and other natural features. The map divides the state into six major regions and 19 subregions which are termed natural divisions and sections. The Missouri Natural Areas System represents forests, prairies, marshes, glades and other natural communities from the various natural divisions and sections. This provides a basis for identifying areas and conditions best suited for forests. It also helps to define important aspects of soils, geology, topography, flora and fauna that establish the value of particular forest areas. This is a key element of this assessment both in helping to define the values for identifying Forest Legacy Areas and in evaluating the importance of individual tracts proposed for participation in the FLP.

The following discussion provides the background to establish the natural processes and conditions that created, and serve to maintain, the many unique characteristics and associated values of Missouri's forests.

Map 1 – Natural Divisions of Missouri

Many people think of forested Ozark hills and hollows when they think of Missouri. This is indeed a typical landscape of the Ozark Natural Division. The division has an ancient geological history which included several periods of slow uplift accompanied by deep erosion by its streams. This erosion of a fairly level plateau has created a landscape of deep, winding hollows and steep cliffs with few prominent peaks. The erosion also exposed a variety of rocks-sandstone, limestone, dolomite, chert, granite and rhyolite.

The Ozarks have been an exposed land mass for over 250 million years, while surrounding regions were repeatedly covered by glaciers, seas or floods. Staying high and dry for so long permitted uninterrupted use of the Ozarks by plants and animals. The great age, together with diversity of rock types, soils and topography, created habitats for more species of animals and plants than in any other part of the state. Some species, such as the cave-dwelling grotto salamander, are found nowhere else in the world. Special features such as caves, sinkholes, springs and losing streams are associated with limestone geology and, again, with great geologic age. These "karst" features are very important in their association with many forested natural communities, for their value to many unique species including several species of concern, in providing base flow for many streams, and for their scenic beauty. Forests are important in protecting these features and associated species. Since karst and associated natural communities are so important and unique in Missouri and they are most commonly associated with forests, they will be used to help identify important forest areas in Missouri. The presence of karst features will also be used to evaluate tracts that are proposed for participation in the FLP.

Thin Ozark soils often allow the bedrock to be exposed to form another typical Ozark natural community--the glade. Savannas, communities of thinly spaced trees with a well developed

ground flora of native grasses and forbs, occurred throughout the Ozarks, especially where the western prairies met the Ozark forests. Pine and deciduous woodlands made up most of the presettlement vegetation. These are unique and important forest communities that often contain endemic species, including some species of concern that can be threatened by conversion and development on a broad scale. Protection of these unique forest and woodland communities through the FLP can help to preserve these important areas. The Ozark Natural Division is subdivided into six sections based on differences in soils, topography, bedrock and river drainage.

Most of the state north of the Missouri River was twice covered by great ice sheets. Two major glaciers leveled the landscape and pushed rocks and debris over the bedrock. The last Missouri glacier retreated perhaps 400,000 years ago, although other glaciers occupied parts of Iowa and Illinois as recently as 12,000 years ago. The topographic features of the Glaciated Plains Natural Division are therefore much younger than those of the Ozarks, and erosion has not had so long a time to sculpt the landscape.

Besides having a leveling effect, the glaciers deposited silts, sands, gravels and boulders, providing parent materials for soil development. The ice sometimes ground rock into a fine glacial flour which was picked up by the wind and deposited over the landscape as a substance called loess. Along the Missouri River, the loess often accumulated to thicknesses of ten to sixty feet or more. In the northwestern counties the wind deposited a thick layer of loess which formed a series of steep dunes or mounds along the east side of the Missouri River.

The gentle terrain and deep soils have made the Glaciated Plains Natural Division ideal for agriculture. Presettlement vegetation was deciduous forest, tallgrass prairie and oak savanna. Prairie has all but disappeared from the Glaciated Plains, but tiny remnants along some railroad tracks still testify to its former existence. The four sections of the Glaciated Plains Natural Division are based on differences in soils, river drainage and glacial history. Much of this area is open grassland and cropland with limited forests expect in riparian areas. The protection of riparian forests and the potential for restoration of riparian forests will be important considerations for FLP participation should any Forest Legacy Areas include portions of the glaciated plains.

The Ozark Border Natural Division is a broad transitional zone where the Ozarks blend into other regions to the north and east. Ozark-like hills and hollows occur along the major streams, but the soils, often derived from loess, are often deeper and more productive than those of the Ozarks. The ranges of many plants and animals of the Glaciated Plains and the Ozarks overlap in the Ozark Border Natural Division. The division was mostly wooded in presettlement times, but prairies, glades, savannas and other natural communities also occurred. Springs, caves, sinkholes, cliffs and pinnacles are common natural features. Many of these features will help to define Forest Legacy Areas and represent important values associated with Ozark forests. The Ozark Border Natural Division is subdivided into two sections.

The Missouri and Mississippi rivers and their former floodplains and terraces are distinctive enough to form their own Big Rivers Natural Division. The lower portions of the Grand and Des Moines rivers also are included. The big rivers and their associated land areas have been altered greatly by channel modifications, levying, construction of locks and dams, and agriculture.

Chutes, sloughs, islands, sand and mud bars, marshes, prairies and forests once covered this division. The soils are deep sediments that the rivers deposited during recent geologic times.

About ten species of fish are restricted in Missouri to the Big Rivers Natural Division and about 30 more have distributions centered in this area. In the fall, hundreds of bald eagles concentrate along the rivers to over winter. The establishment, management and protection of bottomland and riparian forests are important elements in providing the habitat for these species and thus, hold special value in the Big Rivers area. The Big Rivers Natural Division is subdivided into four sections.

The Mississippi River flows southward into the Mississippi Lowlands Natural Division, a region that less than 100 years ago was mostly swamps and lowland forests. The soils of the lowlands are formed from alluvial deposits hundreds of feet thick. There is a fairly sharp separation in the form of an escarpment between the Mississippi Lowlands and the Ozark and Ozark Border natural divisions to the north. The lowlands landscape dates back several hundred thousand years, when it formed the upper end of what is now the Gulf of Mexico. Much later, during the time of the glaciers, meltwater from the retreating ice formed the Ohio and Mississippi river systems. These rivers altered their courses several times and along with the Castor, St. Francis and Whitewater rivers, formed the ridges, basins and low terraces characteristic of the division. These rivers also deposited the thick sediments over the division. Crowleys Ridge, the division's most prominent topographic feature, forms its own section. During the early to mid-1900s, the Mississippi Lowlands Natural Division was drained, the timber cleared and the land converted to agriculture.

Many plants and animals of the coastal plains occur in the lowlands, and many of these species are restricted in Missouri to this region. Although common in eastern forests, they are poorly represented in Missouri, so maintenance and protection of these forests will be important considerations in the southeast Missouri Mississippi lowlands.

The Osage Plains Natural Division is Missouri's prairie region. About three-quarters of this division was covered with prairie before settlement, and most of our remaining prairie is here. Forest and savanna occupied most of what was not prairie. This unglaciated area is characterized by gently rolling hills and plains. The soils were developed mainly from the underlying bedrock instead of from material formed by the glaciers as in the Glaciated Plains. The Osage Plains Natural Division is generally lower in elevation than the Ozarks, has few caves, springs or sinkholes, and has less rugged terrain. Streams commonly have shallow valleys and broad floodplains with many sloughs and marshes. Erosion has carved cliffs and shelter caves along some of the same streams. Most of the common plants and animals of the Osage Plains are also found in the Glaciated Plains. There is only one section in this natural division.

The natural divisions map provides a framework for thinking of Missouri's natural history. Of course, the exact boundaries of the divisions and sections are not clearly visible on the landscape, but dividing the state in this way does allow us to make certain generalizations about Missouri. The map also gives us some understanding of the influence of the land's history on the present landscape, plants and animals. (Thom and Wilson, 1980). The information used to define the Ecological Classification System provides a good basis for relating geology, soils, topography and vegetation to natural ecological systems and some of the cultural influences that helped shape

these natural landscapes. This provides good background in identifying important forest types and features as well as in providing viable management options for tracts contained in the FLA's.

(**NOTE:** For a technical discussion of this subject see "The Natural Divisions of Missouri" by R.H. Thom and J.H. Wilson in *Transactions of the Missouri Academy of Science,* Vol. 14, 1980, pp. 9-23.)

B. Cultural Heritage Resources

Missouri's cultural history is rich and varied. Native Americans, most notably the Osage, Fox, Missouri, and Sauk all inhabited Missouri prior to European settlement. Cherokee and Shawnee tribes were also found in Missouri during the times of European settlement. These tribes all hunted and farmed, establishing small communities but ranging out to hunt. Native American artifacts are regularly found throughout the state, including implements, tools and a variety of points.

Missouri was originally settled by French trappers and traders. Later, Spanish traders and German farmers settled in Missouri. Many Missouri communities have rich French and German heritage and many bear French and German names. As of May, 2004 there are 37,058 archaeological sites recorded at the Archaeological Survey of Missouri (ASM). The ASM maintains a database of these sites and offers assistance in identifying and protecting sites. (Archaeological Survey of Missouri, 2004) Conversion of forest land may result in the loss of important cultural artifacts and resources if they are not identified in the process. The presence of cultural resources or archaeological sites will be a consideration when ranking proposed tracts within an FLA.

MISSOURI FORESTS: CRITICAL ISSUES AND ENVIRONMENTAL IMPACTS

Forests play a vital role in Missouri's ecosystems, scenic value, recreation and economy. Although forested acreage has been steadily increasing in Missouri over the past two decades, it is declining in many areas leading to the loss of critical ecosystems and environmental protection. This assessment addresses the most common threats identified by the Missouri Forest Legacy Committee. These threats were also identified as important through the public input received on the FLP. (Appendix B)

A. Forest Fragmentation & Conversion

Population trends over the past half century indicate steadily increasing population with decreasing densities in urban areas and increasing densities in rural areas. The rate of population growth from 1990 to 2000 averaged 9.3 % in Missouri. These increases are associated not only with urban fringe, but more and more frequently with rural areas. Much of the development coincides with the most heavily forested portion of the state. The increasing population densities in rural areas are associated with conversion of forest land for residential and commercial developments, and infrastructure expansions. Larger tracts are being subdivided into smaller tracts with multiple ownerships. Each new owner has different objectives for owning the land and many are developing home sites and mini-farms in these once forested areas. Average tract size is decreasing while the number of landowners continues to increase. Previously forested areas are partially or completely cleared, breaking the continuity of forested ecosystems. One of the primary objectives of the FLP in Missouri is to reduce the fragmentation and conversion of important forest areas.

According to a 2002 report by The Brookings Institution, growth is dispersed far and wide across the Missouri landscape and frequently encroaches upon farmland and green space. Rural areas were responsible for 36 percent of the state's new growth in 2000, nearly twice the share they represented the previous decade. Rural areas now make up nearly one-third of Missouri's population as well as a third of population growth. Sixty percent of the state's population growth in the 1990's took place outside of the St. Louis and Kansas City metropolitan areas. Open-country living increased in all but 17 of the state's 93 rural counties. In rural areas, fully 71 percent of all growth in the 1990's took place in areas located outside rural cities and towns. This ensured that by decade's end more rural Missourians lived outside of towns (912,634) than in them (887,776). (The Brookings Institution, 2002)

Between 1982 and 1997, the dispersion of population and jobs in Missouri resulted in the conversion of 435,400 acres, or 680 square miles of fields, farmland, forests or other green space to "urban" use. This development represented a 35.4 percent increase in the state's urbanized area even though the state's population grew just 9.7 percent during that same period. Of this newly altered land, rural (non-metropolitan) tracts accounted for 42.8 percent, or 186,700 acres of it. That amounted to some 291 square miles of lost farm, forest, or prairie in rural Missouri. The growing interest in open-country living is demanding the proliferation of new homes and mobile homes on the outskirts of small towns and beyond. In fact, the largest share of the state's quickening rural growth is now taking place outside of established places, in the unincorporated lands that surround them. Missouri's current pattern of widely scattered population growth on large lots in remote areas threatens to fragment native ecosystems, encroach on established farm zones, and taint the state's clear streams and lakes with sewage and surface water runoff. (The Brookings Institution, 2002).

Today's low-density residential development threatens the precious rural character that made the state's Ozark and other landscapes desirable in the first place. Unplanned residential development increasingly interrupts timeless Ozark landscapes. The scatter of construction has likewise begun to diminish the nearby forests and streams where generations of Missourians have gone fishing and hunting. Fringe subdivisions and scattered large-lot homes in the country each raze the forests that support wildlife. Widespread construction has accelerated erosion. As a result, a serious turbidity problem clouds numerous ex-urban lakes and muddies popular fishing coves. Widespread land conversion means that the construction of subdivisions, retail centers, and fast food strips is effacing the rural scenery and small-town atmosphere that connects the state to its roots. With more development in the coming 20 years, remarked *The Springfield News Leader*, the Ozark region especially will see continued dispersed development that could "cost its reputation as the heartland of rural America, quaint, unspoiled, and friendly." (The Brookings Institution, 2002).

The loss of 680 square miles of undeveloped land between 1982 and 1997 has most certainly harmed the natural systems that provide critical habitat for wildlife and perform critical "ecosystem services" such as the reduction and slowing of stormwater runoff. Exacerbating this impact is the decentralization of growth into the open country. This dispersal widens the area of intrusion and increases habitat fragmentation, as a wider scattering of new homes and mowed yards divides the remaining forests and grasslands into smaller, more disconnected pieces.

Streams and smaller ponds in the suburbs have been harmed by construction practices, increased use of septic tanks and lawn fertilizer, and the installation of impervious surfaces such as roads, sidewalks, and roofs. Construction practices frequently increase soil erosion that can choke small creeks and streams, especially if they include the loss of associated riparian forests. The spread of impervious surfaces increased the volume of runoff and loads it with pollutants such as oil, detergent, herbicides, and fertilizer. Suburban development may also impact streams more directly through the loss of stream channels by shortening, channelizing and removal of riparian forests. (The Brookings Institution, 2002).

The FLP can provide landowners with economic options to help prevent fragmentation and conversion of critical forested tracts in the Ozarks and the urban fringe. Protection of these valuable forested areas will not only reduce forest and habitat fragmentation, but will also help to preserve the natural landscape and rural character of Missouri. Fragmentation and the associated threat of conversion will be one of the primary considerations when ranking tracts proposed for participation in the FLP in Missouri.

B. Forest Health

Forest health issues are becoming increasingly important in Missouri. Oak decline is impacting hundreds of thousands of acres of black and scarlet oak in Missouri. This decline with associated damage from unprecedented numbers of red oak borer attacks is causing millions of dollars in economic value of Missouri's forests as well as causing major changes in forest ecosystems in parts of the state. Existing forest industry is not able to handle the large volumes of low grade materials at the rate they are being created. Major changes in the relative abundance of black oak species in mixed stands can have significant impacts on hard mast production to the detriment of forest dependent wildlife species. Well managed forests can help to reduce the threat of oak decline and provide a steady pipeline of wood to support forest industry. Conversion of lower quality sites from red oaks to shortleaf pine and white oak will also serve to improve forest health. Greater stocking of pine can also serve to create new markets and industry providing more economic opportunities for landowners.

Missouri is expected to be generally infested with gypsy moth within twenty years. Since the majority of Missouri's forests are dominated by oak species on relatively poor sites compared to other northeastern states, it is critical that forests be managed to increase health and vigor through regular thinning and harvests. Since most of Missouri's forests are privately owned, it is important that a variety of management opportunities are available to landowners. Management efforts targeted at oak decline will also serve to increase forest health and more resistant to mortality from gypsy moth infestations.

Ice, high winds and tornados damage hundreds of forested acres annually. The randomness of these natural disasters make prevention and mitigation difficult, but the presence of a viable forest industry in the state can provide opportunities to salvage wood and regenerate damaged forests.

The threat of forest conversion following significant losses due to forest health problems is an ongoing threat. This, coupled with improved cattle markets combine to increase the likelihood of declining forests to be converted to pasture or developed for other non-forest uses. Missouri is

the second leading livestock state in the nation, so improved livestock markets can lead to unplanned, adventitious forest conversion, particularly when forest health is decimating the existing forest cover. Actively managed forests may be the best protection against forest losses due to health issues. It can also help to improve forest values as a viable economic option to conversion for other non-forest economic uses. Active forest management is practiced on much of the publicly owned forest lands, so it is imperative that programs and technical assistance is made available to encourage the management of privately owned forest land. The FLP can provide incentive to maintain forest land and encourage management of those forests.

C. Inappropriate Timber Management

High grading, the practice of taking the best and leaving the rest, is a common practice in Missouri. This practice can impact the long-term sustainability of forests, reduce overall health and condition of forests, adversely impact forest ecosystems, and coupled with poor logging practices, threaten the states water resources. This is primarily an issue on privately owned forest land. Efforts to reduce high grading have relied on educating landowners and training loggers.

Sustainable forestry programs that include forest certification have provided additional incentive for landowners and forest industry to adopt better, sustainable management and harvesting practices. Unfortunately, it is estimated that less than ten percent of the timber harvested in Missouri is done under the guidance of a professional forester. High grading, poor tree selection, residual stand damage, and lack of proper forestry best management practices continue to be commonplace in Missouri. These poor management practices reduce the overall health and value of the forest thereby reducing economic options and increasing the threat to convert to non-forest uses or discontinue management completely. Logger training and certification offered jointly by the Missouri Forest Products Association and the Missouri Department of Conservation is beginning to have a positive impact. A more active and viable Consulting Forester Association is also striving to provide forest management services to more forest land owners. Management programs such as the Forest Stewardship Program, Forest Cropland Program, and the Tree Farm Program all help to promote active, professional forest management in Missouri and will all complement the FLP in addressing this threat in Missouri forests.

D. Mineral Extraction and Production

In 2001, the estimated value of non-fuel mineral production for Missouri was $1.34 billion, based upon preliminary U.S. Geological Survey (USGS) data. The State remained 10th in rank among the 50 States in total non-fuel mineral production value, of which Missouri accounted for nearly 3.5% of the U.S. total. Crushed stone, cement (portland and masonry), lead, and lime, in descending order of value, accounted for about 88% of Missouri's total non-fuel mineral production value in 2001. Missouri continued to be the top lead-producing State in the Nation, producing significantly more than one-half the Nation's output and about 2 times and 15 times as much lead as that of the two next highest producing States, respectively. However, both crushed stone and portland cement, by value, remained the State's leading non-fuel minerals in 2001. (USGS, 2002)

Based upon USGS preliminary estimates of the quantities produced in the 50 States in 2001, Missouri remained first in lime and fire clay, second in iron oxide pigments, third in zinc, fifth in portland cement, and ninth in gemstones (in descending order of value). Missouri is one of the

Nation's leading producers of crushed stone as well as a significant producer of construction and industrial sand and gravel, masonry cement, and silver. (Missouri Department of Natural Resources, Division of Geology and Land Survey/U.S. Geological Survey, 2002) Extraction of these minerals is often accomplished through surface mining that leads to the conversion and loss of forest land. Surface mining for crushed stone is common in most counties throughout the state due to the limestone and dolomite bedrock found through most of the state. The threat of forest conversion for surface mining for crushed limestone increases in rural areas as populations increase in these areas bringing the need to expand road infrastructure.

Missouri is the nations leading producer of lead, with the majority of the production centered in the heart of the St. Francois Mountains in Washington, Iron, Reynolds, Crawford, and Dent Counties. Small amounts of copper, silver and zinc are also mined in this same region of the state. Since limestone is prevalent throughout the state, crushed stone is produced in nearly every county. Clay production is most prevalent in counties bordering the Mississippi and Missouri Rivers. Mineral production is considered to be a compatible use in a FLP conservation easement, so no more than 5% of a FLP tract can contain unrestricted mineral or gas rights.

EXISTING MEASURES TO CONSERVE FOREST LAND IN MISSOURI

There are many existing efforts to conserve Missouri's forest land. Public lands owned and administered by federal, state, and local governments have a common goal of natural resource conservation, although individual agency objectives and missions may differ. In 2004, approximately 17% of all forest land was in public ownership. Currently, public land acquisition occurs at a very slow rate.

Several federal and state programs are designed to assist private landowners in protecting and enhancing their forest resources. They include the following:

A. Forest Crop Land Program

Established in 1949, the Forest Crop Land (FCL) Program was created under the State Forestry Law. The FCL program provides for long-term protection and management of privately owned forest land in Missouri. Land is enrolled for 25 years and receives reduced property tax assessment, annual inspections from state forestry staff, increased priority for management assistance and priority fire protection assistance. Timber may be harvested under an approved plan, but a 6% yield tax must be paid back to the State when timber is sold. Presently, a total of 100,715 acres are enrolled in the FLC program. This is down from a high of over 440,000 acres classified in the 1970's. Current high stumpage prices and the limited appeal of minor property tax savings coupled with the long (25 year) commitment has reduced the appeal of the FCL in Missouri. Recent attempts to revise the program to make it more appealing have failed in the legislature.

B. Forest Stewardship Program

The Forest Stewardship program was established by the Forest Service in 1990. Landowners receive detailed Landowner Forest Stewardship plans (LFSP) and priority for Stewardship Incentive Program and Forest Land Enhancement Program cost-share funds. Missouri has a total of over 1,800 LFSP and write an additional 100 plus plans annually. These multi-resource plans are the basis for sound, sustainable resource management based on landowner objectives and

resource capabilities and restrictions. Recommended cultural practices are often completed with the use of State and Federal forestry cost-share programs. The FLP requires that all conservation easements be managed under an approved forest stewardship plan.

C. Tree Farm Program

The Tree Farm Program is a national recognition program of the American Forest Foundation. The Missouri Tree Farm Program is jointly sponsored by the Missouri Forest Products Association and the American Forest Foundation. It is directed by the Missouri Tree Farm Committee and supported by State and consulting foresters. The Missouri Tree Farm Program is a recognition program for landowners who are actively managing their forest land. Missouri currently has 848 Tree Farms that include over 273,471 acres. Tree Farms have been reduced from a high of over 1,000. It is expected that forest certification available through the Tree Farm Program will increase interest and participation in the program in the future. Many Tree Farmers also have Forest Stewardship Plans and work closely with professional foresters to implement those plans.

D. Cost Share Programs

Cost-share assistance is available to forest landowners through several state and federal programs. Farm Bill programs including CRP, WHIP, EQIP, and FLEP have all been effective in assisting landowners complete forest management practices. The Department of Conservation has a landowner cost-share program that includes multiple forest, fish and wildlife conservation practices. The approved forestry practices available through the program closely mirror the practices approved under the SIP and FLEP programs and include tree planting, natural regeneration, forest improvement, livestock exclusion and various stream protection and wildlife habitat improvement practices.

Landowner access to management and cost-share programs is key to promoting active and responsible forest management. These programs will complement forest management activities on FLP easements.

E. Landowner Assistance

The Missouri Department of Conservation provides forest management assistance free of charge to Missouri landowners. Assistance is provided with planning, forest inventory, timber sales, tree planting and other forest cultural practices. Approximately 55 field foresters and 40 Private Land Conservationists are available to assist landowners with resource management on their land. Consulting Foresters also provide forest management services for a fee. There are presently about 50 consulting foresters in Missouri. The continued availability of forest management assistance is important for the success of the FLP in Missouri.

LAND TRUSTS IN MISSOURI

Land trusts are not-for-profit corporations whose general objectives are to preserve and protect land to achieve conservation objectives. They often operate by acquiring land and interests in land. The guidelines established for the Forest Legacy Program state, “Land trusts have an important and appropriate role to play in the Forest Legacy Program.” Land trusts have been involved for more than 100 years in preservation activities throughout the country. In some cases, land trusts purchase or receive donations of fee interest in land; in other cases, they hold

easements, however they will not hold Forest Legacy Program conservation easements in Missouri. The greatest addition to trust-held acreages has occurred over the past 20 years as development pressure on lands has increased.

The following are examples of land trusts in Missouri. This list is not meant to be all-inclusive, but only gives examples of some of the land trusts whose missions are compatible with the goals of the FLP in Missouri. Other land trusts operate in Missouri and may work in partnership on FLP projects, however, many of these are limited in mission or area served so they are not listed here.

The Nature Conservancy, Missouri Chapter (TNC). TNC works extensively with private landowners to protect natural areas using acquisitions, conservation easements, and voluntary agreements. Much of TNC's focus in Missouri is in the Ozark Highlands region on the Lower Ozarks project based out of Van Buren, but they have been active throughout the state. The Missouri Chapter of TNC, together with members and conservation partners has protected over 150,000 acres of critical natural lands in Missouri.

Ozark Regional Land Trust, Inc. (ORLT) is a private not-for-profit, non-governmental, non-political conservation organization established in 1984 and dedicated to preserving the unique natural character and resources of the Ozark Bioregion. ORLT is operated by a volunteer board of trustees who oversee the activities of the organization and directs its staff of five. ORLT assists willing and interested landowners to sort through, assess, and implement any of the available land protection options. ORLT's most commonly used land protection tool is a conservation easement.

ORLT has completed over 100 projects protecting more than 10,000 acres of land throughout the Ozarks, approximately half are conservation easements. ORLT has been instrumental in protecting many natural and geological features such as waterfalls, caves, significant springs, bluffs, forests, prairies, glades, rivers and wetlands. ORLT also protects urban open space, agriculture lands, historic places and sensitive ecological sites protecting wildlife and endangered species.

The Eleven Point River Conservancy was founded in 2002 to protect and preserve lands of natural, scenic, historic, agricultural, recreational, or ecological significance to the waters of the Eleven Point River. They are a 501(c)(3) not-for-profit corporation that follows strict state and federal guidelines to operate as a land trust. They have a volunteer board of directors that is dedicated to working with the communities of the Eleven Point River valley.

The Open Space Council for the St. Louis Region. The Open Space Council was established in 1965 to preserve open space resources for the people of the St. Louis metropolitan region. By working to preserve open lands, the Open Space Council seeks to guarantee residents, visitors, and future generations the benefits of a more enjoyable, healthy, and livable environment.

The Open Space Council is a 501(c)(3) tax-exempt not-for-profit organization dedicated to conserving public and private open space lands in the St. Louis region. It identifies areas that can be acquired and set aside for public use, and attempts to discourage improper land use and detrimental development. The OSC currently does not process or hold conservation easements.

Preserving and restoring plant and animal habitats, which encourages bio-diversity, is an important outcome of the organization's work.

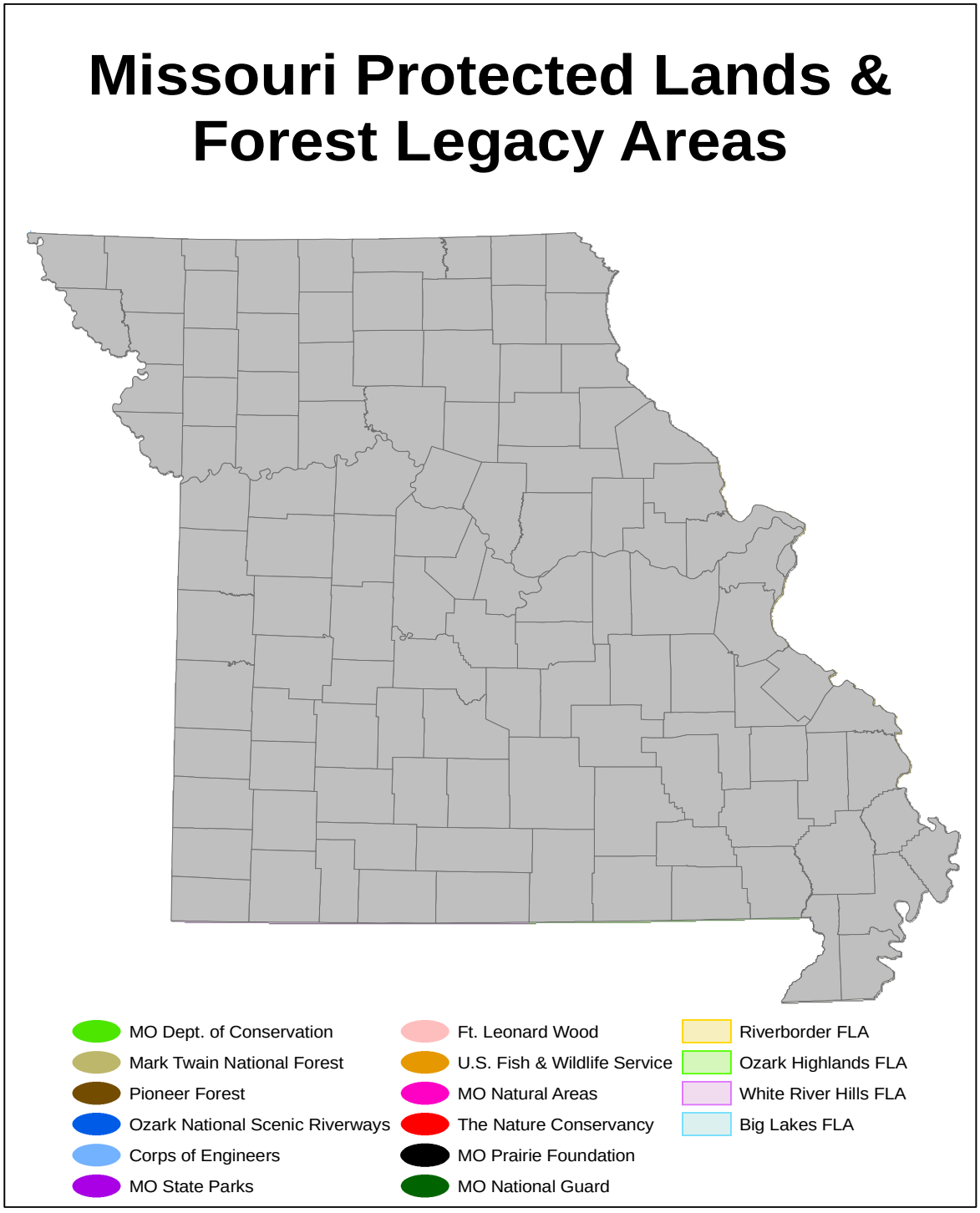
Trust for Public Land

Founded in 1972, the Trust for Public Land is a national not-for-profit organization that works exclusively to protect land for human enjoyment for recreation and spiritual nourishment and to improve the health and quality of life of American communities. TPL work's with landowners, government agencies, and community groups to create urban parks, gardens, greenways and riverways; build livable communities by setting aside open space in the path of growth; conserve land for watershed protection, scenic beauty, and close-to-home recreation; and safeguard the character of communities by preserving historic landmarks and landscapes. TPL seeks to find ways to finance parks and open space; help generate federal, state and local conservation funding; and promotes the importance of public lands. TPL works to facilitate transactions that further their mission but does not hold conservation easements. TPL has been involved in over 3,000 transactions nationally that have helped to protect over 2 million acres. In Missouri, they have been involved in the protection of several thousand acres.

Great Rivers Habitat Alliance

The Great Rivers Habitat Alliance seeks to preserve Missouri's floodplains. GRHA is a partner in The Confluence Flood Plain Joint Venture Partnership which is a loose partnership of public agencies and private organizations who share a goal of preserving, restoring and maintaining approximately 30,000 acres of habitat and floodplain at the confluence of the Missouri and Mississippi Rivers. The GRHA seeks to restrict floodplain development and protect bottomland hardwoods through fee purchase and conservation easements. GRHA has worked cooperatively with the State of Illinois on six Forest Legacy Projects.

Map 2 - Protected Lands in Missouri



PUBLIC PARTICIPATION PROCESS

Public input is an important component of the Forest Legacy Program Assessment of Need. Public participation was divided into two parts for this assessment. The first part reviewed general public input received from several surveys conducted by the Department of Conservation. These surveys gathered general public attitudes towards forests and forest management as summarized below. The second part targeted landowners in each of the four proposed FLA's seeking input into the selected criteria and program implementation. Additionally, input was received from legislative representatives and County Assessors.

A. Summary of Public Attitudes Towards Forest Resources in Missouri

The Missouri Department of Conservation has conducted many surveys and opinion polls that have included questions about forests and forest practices. Recent surveys include: telephone surveys in 1993 and 1996 of forest attitudes and conservation land use; a telephone survey in 1980 and a mail survey in 1989 of urban and rural Missourians about conservation issues; and telephone surveys in 1994, 1995, 1996, 1997, and 2000 about conservation issues. A study is currently underway that repeats the 1980 and 1989 surveys of urban and rural attitudes about conservation topics and issues. (Thorne, 2004)

Important Findings about the Attitudes of Missourians Towards Forest Resources

Missourians have definite opinions about the importance and benefits of forests in Missouri. Most Missourians (over 80 percent) believe forests are important to give off oxygen and to remove carbon dioxide from the atmosphere and to provide habitat for wildlife. Missourians believe the most important benefits of publicly-owned forests are to provide clean streams and to provide places for fish and wildlife habitat. In addition, Missourians are most concerned about the forest activities of litter/dumping/pollution, land clearing/conversion, logging, and urban development. (Thorne, 2004)

The Department of Conservation has strong support to conduct forest management activities. Most Missourians (91 percent) agree that the Missouri Department of Conservation should help private landowners who want to restore native communities of plants and animals. A majority of Missourians (about two-thirds) believe the Department of Conservation is doing a good job of providing services to themselves and their families, the community, and state. Missourians (87 percent) indicate that they "trust the professional judgment of the Department to care for Missouri's natural resources." (Thorne, 2004)

Missourians have mixed attitudes about forest management methods. Slightly over one-half (53 percent) agree that it is ok to use fire to manage forests and prairies. Slightly less than one-half (47 percent) approve of cutting down trees to make lumber, furniture, or other wood products although over 85 percent agree "it is important that we continue to have wood products available even though trees must be cut." Over 80 percent of Missourians agree with the statement related to "setting aside portions of public forests where no timber cutting and vehicles are allowed." There is stronger agreement that "public forest land is wisely managed" (66 percent) compared to "private forest land is wisely managed" (44 percent). (Thorne, 2004)

Although Missourians indicate high levels of satisfaction and trust with the Department, there is a lack of knowledge about specific forest resources. A majority of Missourians (74 percent)

believe that the amount of forest land is shrinking—which is not true. Only a small percentage of Missourians (27 percent) indicate that they believe private citizens own more forest land than government entities--when actually private landowners own the vast majority of forest land in Missouri. About 50 percent of Missouri citizens are aware that most forests in Missouri are not virgin growth whereas 32 percent indicate "forests that have never been logged are common in Missouri"—when uncut or logged forests are very rare in Missouri. (Thorne, 2004)

In 2003, the Missouri Department of Conservation conducted it's most recent general public attitude survey. Nearly 50 percent of respondents said that the Missouri Department of Conservation does not own or manage enough land. (Only 2.2% said "too much" land.) Over two-third's of respondents felt that more land should be acquired. Missourians were asked whether they approved of cutting trees in Missouri for a variety of reasons. Over half of respondents approve of cutting to make lumber or other wood products, over two-third's approved of cutting to provide wildlife habitat, and over 90 percent approved of cutting to improve forest health, condition and to remove dead and dying trees. Of the 36 percent of Missourians who owned a farm or other rural land, 60 percent reported that they had woodlots of forest on their land. Over 33 percent of all Missourians (and over 45% of farm/rural land owners) said they would like the Missouri Department of Conservation to provide more information about tree farming or forest management. (Rikoon et al., 2004)

Additional public input was sought through questionnaires provided at eight Regional Conservation forums. A copy of the information that was provided at the Regional Conservation forums is included in Appendix C. In addition, an article was included in The Forestkeepers newsletter, *The Monitor*. This newsletter is sent to 1510 Forestkeepers who are distributed across the state. The Monitor was also available on-line at the Forestkeeper web site, (http://www.forestkeepers.org). The Missouri Forestkeeper Network was established in 1986 to develop a group of dedicated and informed volunteers working to protect, sustain and enhance Missouri's forest resource through monitoring, advocacy, and education. Each member of the Forestkeeper network has an interest in trees, forests or forest management in the state. A copy of the article and summary of responses is also included in Appendix C.

B. Public Meetings in the Proposed Forest Legacy Areas

Facilitated public meetings were held in four locations within the proposed Forest Legacy Areas to gather public input into the details of the criteria used to determine FLA's and to identify needs and issues related to the implementation of the FLP in these areas. The meetings were held in Springfield (Greene County) to represent the proposed White River Hills Forest Legacy Area; in Salem (Dent County), to represent the proposed Ozark Highland Forest Legacy Area; in Camdenton (Camden County) to represent the proposed Big Lakes Forest Legacy Area; and in Union (Franklin County), to represent the proposed Big Rivers Forest Legacy Area. A summary of the comments and recommendations from those meetings is included in Appendix C.

The public response was very positive overall, with the greatest concern being the perpetual nature of the easements. Much of the interest could be characterized as individual landowners with concerns about protecting their forest lands into the future. Overall, public input was very supportive of the FLP, the program goals and the selected criteria to determine FLA's. Many provided input into the weighting of the selected criteria. Criteria weights from the public input

were summarized and combined with the weights established by the FL Committee to further refine the analysis. The most common concerns expressed were the lack of program availability statewide, the perception that the FLP might infringe on landowner rights by acquiring land or imposing conservation easements on unwilling landowners, the minimum size required for participation, and the perpetual nature of conservation easements. These concerns and perceptions were all addressed to the satisfaction of the participants.

A meeting was also held with Shawn Ordway, the current president of the Missouri Association of County Assessors, to discuss the FLP and identify potential concerns from this group. Mr. Ordway took the information provided to a June, 2004 board meeting and shared it with the group. There were no concerns brought forth by this organization. Mr. Ordway commented that they felt it would not impact assessments or serve to reduce tax base. It was felt that land included in the program would be treated much like land enrolled in other Farm Bill programs except that it would be permanently assessed as forest land. Agricultural assessments in Missouri classify land into one of eight classes based on site productivity. Most forest land is classified in class 5-8 (Class 8 being the lowest productivity), and it is felt that participation in the FLP will not change this.

A meeting was held with State Representative J.C. Kuessner, the Chair of the State Legislatures' newly formed Forestry Caucus. Written information was provided followed by a short discussion of the program. Representative Kuessner felt the program would be a benefit to his constituents. His primary concerns were based on the knowledge that a sector of his constituency is very anti-government and might view the program as a government land grab. He believes this is adequately addressed by the voluntary nature of the program. A September, 2004 meeting of the Forestry Caucus was held in the Ozark Highlands FLA. Information on the FLP and the on-going Missouri AON was presented to the members present. No specific issues or concerns were raised at this meeting.

FOREST LEGACY PROGRAM IN MISSOURI

A. Addressing the Problem

Missouri's forests are valued for their scenic beauty, for recreation, for water quality and watershed protection, for the social and economic values they provide, and for their contributions to sustaining and improving the quality of life in Missouri. The combination of these values and the relatively low land values in Missouri attract many to purchase forest land for these amenities. Unfortunately, many do not understand the interconnectedness of all these forest values, and unknowingly threaten one or more value by mis-management, conversion, fragmentation or lack of management. As forest land is fragmented into multiple ownerships, the threat of forest conversion increases as the objectives of each individual landowner changes.

Missouri is considered a rural state with a total population of 5.6 million people and a total area 69,709 square miles for an average population density of 80 people per square mile. Fully 45 percent of Missouri's population now lives outside the two large metropolitan areas (St. Louis and Kansas City), with the remainder scattered in small communities and surrounding unincorporated areas throughout the state, (Approximately 92 percent of the towns in Missouri contain less than 5,000 people). (U.S. Census Bureau)

Missouri's population grew 9.3 percent between 1990 and 2000 with much of that growth occurring in urban fringe, major travel corridors, and in tourist areas in central and southwest Missouri. Most of the fastest growing counties in the state are included in the proposed FLA's. Many of these counties also contain important and valuable forest resources. In addition to this growth rate that doubled from the 1980's, population is increasing at an alarming rate outside of incorporated areas in the state. This has resulted in the conversion and development of 680 square miles of forests, fields and farmland from 1982 to 1997. Conversion of rural land (outside of metropolitan areas) accounted for 42.8 percent, or 186,700 acres of the state's total. (The Brookings Institution, 2002). Rural and urban fringe properties are quickly becoming subdivided and forest land is either cleared or taken out of production due to landowner objectives. The Forest Legacy Program should provide a viable economic option to help reduce fragmentation and loss of forest land. Forest Stewardship Plans will be developed for all property participating in the FLP. These multi-resource plans will consider the values of all forest amenities, the most important of which is the retention of large, contiguous forested areas.

B. Missouri's Forest Legacy Program Goal:

To maintain large blocks of important privately-owned forest land that will supply the infrastructure to protect and conserve the important forest values for which the forest was selected. These values are critical watersheds and water supply protection, species richness, native forest ecosystems, karst features, and species of concern. Protection will be in accordance with providing for economic stability, forest stewardship and sustainability through the promotion of working forests.

C. Eligibility Criteria for Forest Legacy Areas

The Missouri Forest Legacy Committee developed a list of Eligibility Criteria that are based on the FLP purpose to protect environmentally important forest areas that are threatened by conversion to non-forest uses, in order to determine what forest values, traditional uses and conversion threats are most important in Missouri. The list was reviewed, modified and approved by the State Forest Stewardship Coordinating Committee. The Eligibility Criteria will be used to identify important forest areas, from which Missouri will propose specific Forest Legacy Areas. The identified criteria are divided into three groups including forest values (the focus here is on the biological and environmental values), traditional forest uses (this is a subset of the forest values that focuses on the socio-economic values), and the greatest perceived threats for forest conversion in Missouri. The approved Eligibility Criteria that will be considered in this AON are as follows and further described below:

Biological and Environmental Forest Values:

- Areas with large forests
- Species richness (plant and animal)
- Because shortleaf pine was once a much larger component of our forests and is at the northern extent of its range in Missouri, germplasm conservation for shortleaf pine is an important consideration.
- Species of conservation concern, including both State and Federally listed T & E species
- The Current River watershed/ecosystem is heavily forested and important for 25+ aquatic species of conservation concern.
- Bottomland forests and big river ecosystems.

- Riparian or watershed protection should be considered in sensitive areas. Consideration should be made for protecting large watershed lakes.
- Large forests that have connectivity to other public land or protected private lands.
- Forest areas with karst (geologic) features.

Traditional Forest Uses:

- The presence of primary forest industry is a criteria.
- Traditional Forest Uses are the uses from which the FLP is protecting conversion. The Missouri Forest Stewardship Committee identifies traditional uses as follows: Timber harvesting is an important tradition in Missouri particularly in areas where it is tied closely to the local economy. It is less important in urban areas where traditional markets are limited. Hunting and outdoor recreation are important traditions in Missouri and will be used to help rank tracts for participation in the FLP. These criteria are adequately represented by the amount of forest cover because forest-based recreation is only found on forested tracts.

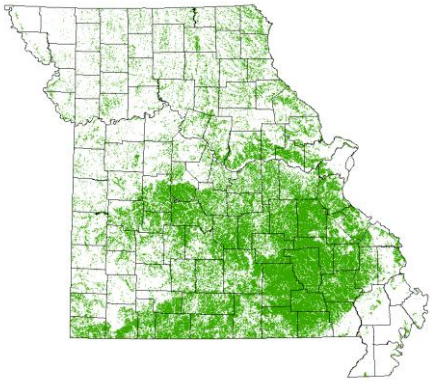
Threats to Conversion from Forest Uses:

- Fragmentation and parcelization associated with population growth are criteria. Population growth or a surrogate will be used to represent fragmentation and conversion pressure in identifying FLA's.

Biological and Environmental Forest Values Criteria:

1. The Ozark region of Missouri is the largest contiguous block of forest in the mid-west with 260-270 endemic species in the Ozark Highlands alone, many with some element of conservation concern. It is important to maintain the integrity of this contiguous forest cover in Ozark forests to maintain ecosystem health and diversity, so large forested tracts have been selected as important criteria in identifying Forest Legacy Areas in Missouri. (The satellite derived National Land Cover Type Database (NLCTD) is used with a minimum tract size of 100 acres south of the Missouri River and 50 acres north of the Missouri River applied to assess these criteria).

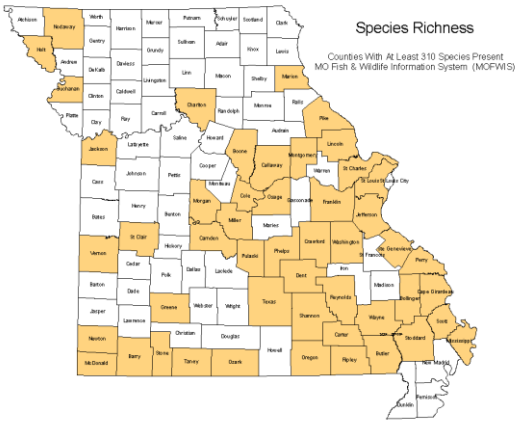
Map 3 – Forested Blocks



2. Species richness (plant and animal) was also selected as important criteria. Missouri lies at the crossroads of several Ecoregions. As such, it contains a rich diversity of species

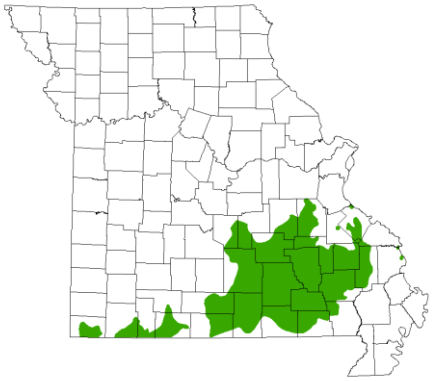
that are at or near their normal geographic range and/or that are endemic to Missouri. Many of these species are important components of the ecosystems in which they occur and many are closely associated with forests. Forest protection and management afforded by the FLP will help to maintain the rich diversity of species dependent on Missouri's forests. (Data from the Missouri Fish and Wildlife Information System was used to represent these criteria. The number of identified species in each county varied from to 155-553. There was a natural break in the data at 310 species per County so this was the level selected to represent the Counties with the greatest species richness)

Map 4 – Species Richness



3. Since shortleaf pine was once a much larger component of Missouri's forests and is at the northern extent of its range in Missouri, germplasm conservation for shortleaf pine is an important consideration. This recognizes the importance of maintaining the integrity of the shortleaf pine gene pool and forest types in Missouri. Proper management of pine forests is essential to maintain shortleaf pine as a viable component of southern Missouri forests. Management and restoration of shortleaf pine on tracts within its native range will be considered when ranking proposed tracts within FLA's. (Historic range data for shortleaf pine cover types is used to represent these criteria).

Map 5 – Shortleaf Pine Native Range

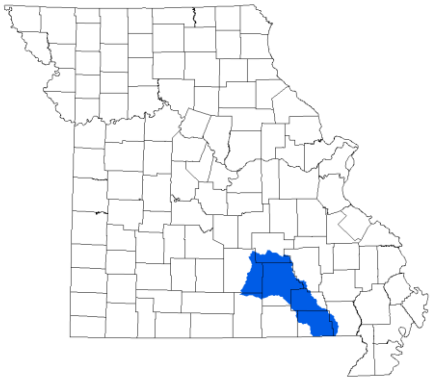


4. Species of conservation concern were identified as important criteria for this evaluation. State and Federal T&E species and species of concern that are associated or dependent on forests will receive special consideration in ranking proposed FLP tracts within each FLA. (The Missouri Heritage database is used to evaluate these criteria).

Map 6 – Species of Conservation Concern

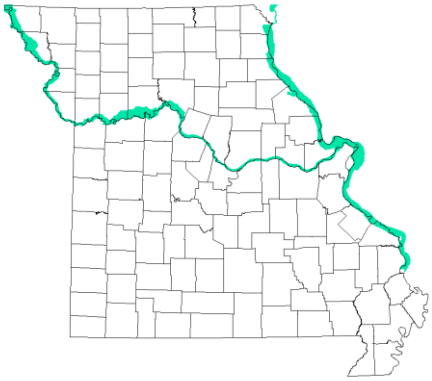
5. The Current River watershed/ecosystem is important for 25+ aquatic species of conservation concern and is used as criteria. The Current River is designated as a National Scenic River and provides considerable public recreation opportunities. It is located in the most heavily forested portion of the state so its value and character is closely tied to these forests. The Forest Legacy Program can serve to help reduce commercialization and associated forest conversion in this important watershed. (The Current River watershed is used to represent these criteria).

Map 7 – Current River Watershed



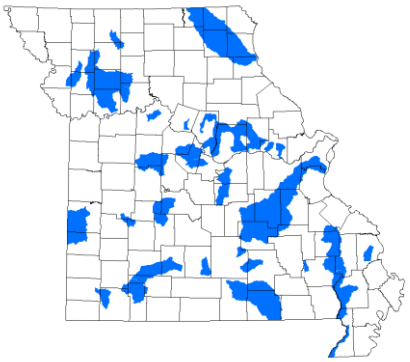
6. Bottomland forests and big river ecosystems were selected as important criteria. Missouri's bottomland forests were greatly reduced in the twentieth century through conversions to agricultural uses. These forests are an important component of the big river ecosystems systems. (NLCTD data were filtered for bottomland forest and big river associated Ecological Land Types (ELT) to represent these criteria).

Map 8 – Big River Ecosystems

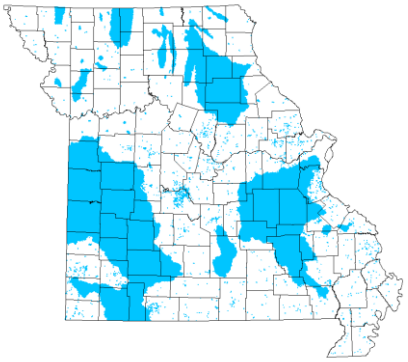


7. Water quality is an important issue in Missouri. Riparian or watershed protection should be considered in sensitive areas. Consideration should be made for protecting large watershed lakes such as Lake Springfield in southwest Missouri and Mark Twain Lake in northeast Missouri. Forests are crucial in protecting both surface and ground water supplies, so the protection of water quality and quantity was deemed an important component of this evaluation. (Watersheds of reservoirs that are used for municipal water supplies were used to represent these criteria. A second data set representing priority watersheds in Missouri was also used. These were derived from Regional Management Guidelines that were developed in 1997-98).

Map 9 – Priority Watersheds and Municipal Water Supply Watersheds



Priority Watersheds



Municipal Water Supply Watersheds

8. Karst (geologic) features are important criteria in Missouri. They can also be tied closely to water quality in parts of the state. Forests are important in protecting karst features and in providing habitat for associated wildlife, including some T&E species. Conversion of forest land to non-forest uses can endanger important karst features and have a negative impact on associated wildlife and ground water quality and quantity. Missouri is often referred to as the Cave State, so protection of caves and other karst features will have positive natural, biological and cultural impacts. (A dataset prepared by Dr. William Elliot indicating the number of caves per county will be used as a surrogate to represent karst features in the evaluation. Counties selected below each have 50 or more known caves).

Map 10 – Karst Features

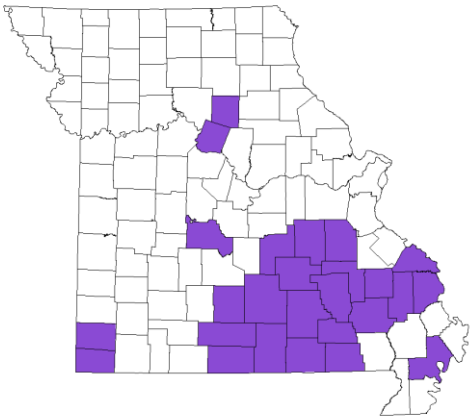
9. The committee determined that forest-based recreation is NOT important criteria for this evaluation due to the high levels of recreational opportunities available on public lands in Missouri. Public access and recreational opportunities, however, will be considerations when evaluating and ranking proposed projects within FLA's..

10. Visual or aesthetic considerations were also determined NOT to be of high concern or importance for this analysis, however aesthetics will be a consideration when evaluating and ranking proposed projects within FLA's.

Traditional Forest Use Criteria and Considerations:

1. A viable, sustainable forest industry has been of great importance in parts of Missouri. Timber harvesting is therefore an important tradition in Missouri particularly in those areas where the local economy is closely tied to the forest industry. It is less important in more urbanized areas where traditional timber markets are limited and alternate economic options are available to forest owners. The ability to manage and harvest timber from tracts enrolled in the FLP is important if the program is to be successful in Missouri, so maintenance of forests as viable economic engines in rural, heavily forested landscapes are important criteria. (A database of primary sawmills by county from 2001 TPO data indicating the level of saw timber removals per county is used to represent these criteria).

Map 12 – Primary Forest Industry



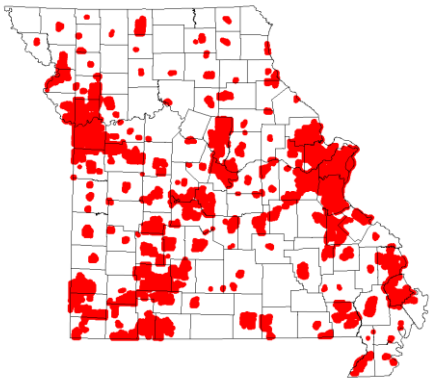
According to a 2000 survey conducted by the Missouri Department of Conservation and the U.S. Forest Service, Missouri's primary wood-using industry was comprised of 394 sawmills, 8 cooperage mills, 6 charcoal plants, 4 handle mills, 1 veneer mill, 1 pulp mill and 9 mills producing other products in 2000 (Piva and Treiman, 2003). This industry processed 127 million cubic feet of industrial roundwood. Ninety-three percent of the industrial roundwood processed was cut from Missouri's forestlands.

2. Hunting and other outdoor recreation is important in Missouri so the ability of landowners to continue to use forest land for hunting and other forest-based recreation on FLP tracts is an important element. This consideration is addressed with criteria 1 under the biological values since most forest-based recreation is associated with large and contiguous forest tracts.

Greatest Threats to Conversion from Forest Uses:

1. Fragmentation and parcelization are the most critical factors impacting the long-term health and sustainability of Missouri's forests. The majority of the fragmentation is related to sprawl associated with urbanization. This is of particular concern where it occurs in rural areas. (The population change by county and total county population data from the 2000 Census database is used to represent this threat in the analysis.

Map 12 – Increase in Households per County 1990-2000



2. Forest health issues including, but not limited to, oak decline and red oak borer, gypsy moth and fire are all important considerations and can be addressed to some degree with proper forest management that is a cornerstone of FLP participation. MDC data on the susceptibility of forest types to oak decline, gypsy moth trapping records and fire occurrence data are very closely tied to forest cover in the state. This is represented by value 1 above.

3. Poor or non-existent forest planning or management, and inappropriate harvesting practices reduce the health and sustainability of forests, effectively increasing the threat for forest conversion. High grading of forests, the practice of taking the best and leaving the rest, is often considered the major problem in Missouri related to poor planning, management and harvests in Missouri. Additionally, poor water quality is another negative outcome of this lack of proper management. Conversely, improved water quality is an ecological and social benefit of proper forest management. This also has long-term impacts on the economic viability of forests that can lead to conversion for non-forest based economic opportunities. This threat is impossible to analyze in regard to identifying FLA's, but can be partly addressed by requiring proper planning, management and harvests on participating lands within the FLA's

4. Lack of economic opportunities for landowners was identified as a conversion threat in less developed portions of the state. This often leads to conversion of forest land to agricultural other non-forest uses, or to fragmentation for development. Encouraging sustainable forest management and maintaining viable timber markets, coupled with initiatives to reduce property taxes on managed forest land, can all help to reduce forest conversion.

   Escalating property taxes in developing areas can create a burden on landowners who desire to keep their land in an undeveloped state. Assessments based on "highest use" penalize landowners who manage their property for forest or agricultural uses. This can unfairly increase the tax burden on those lands to the point that it is not economically desirable to continue managing the land for forest values. Landowners faced with this dilemma are often forced to sell all or portions of their ownership or change land use to

options that provide greater or more regular income from the land. Missouri statutes direct the State Tax Commission to promulgate rules regarding property assessments. The State Tax Commission developed an eight class system to assess agricultural land based on site productivity. Values are set annually by the commission. Participation in management programs such as the Tree Farm program, Stewardship program, Forest Crop Land program, or Forest Legacy program can be helpful in establishing forest management as the basis for reduced property assessments.

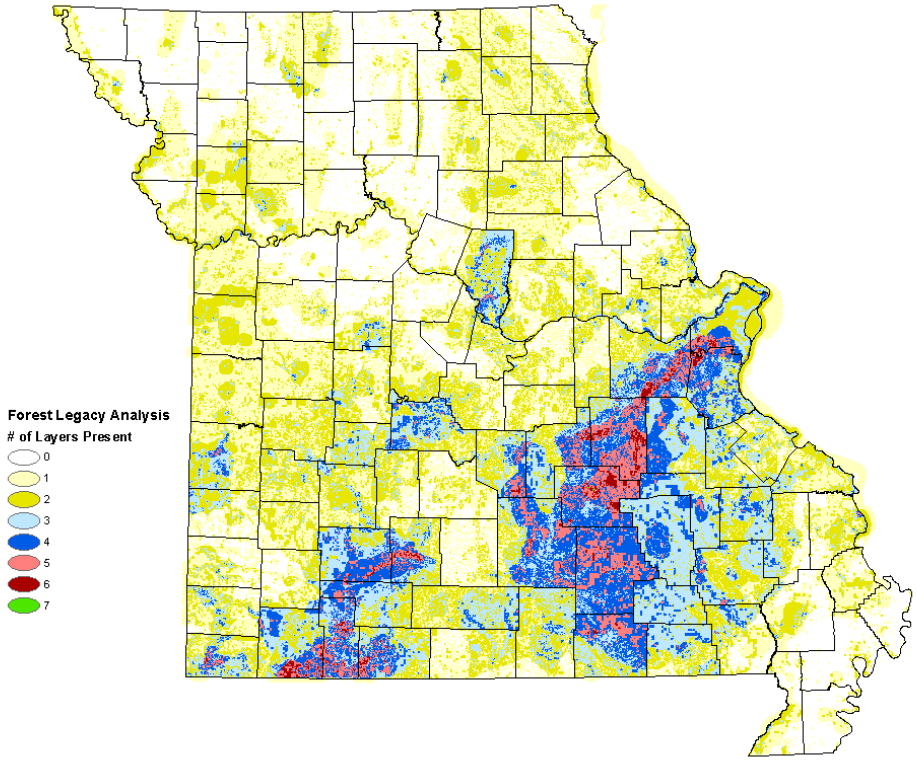
D. Assessment of Forested Areas

The assessment and evaluation of Missouri's forests was a multi-step process designed to identify forest areas that best define eligibility criteria. The steps included:

1. Define important forest values, traditional uses and threats to forest land within Missouri.
2. Assemble data to represent the important criteria selected.
3. Analyze representative spatial data in ArcView to identify areas with the highest combination of forest values and the greatest threat for forest conversion.
4. Weight criteria to reflect the relative importance of each criteria regarding its influence on the identification of FLA's.
5. Solicit public input into the selection and importance of identified criteria as well as the implementation of the FLP in Missouri.
6. Incorporate public input into the analysis to determine areas with the highest priority for participation in the FLP.
7. Expand proposed FLA's to the County level to simplify FLA boundary description.
8. Define values, threats and objectives within each proposed FLA.

An analysis of the data representing the selected criteria above was conducted in ArcView to provide a spatial representation of areas in which the greatest number of criteria were present. This initial analysis was unweighted. The result is the following map indicating the areas with the highest number of criteria represented.

Map 13 – Unweighted Analysis

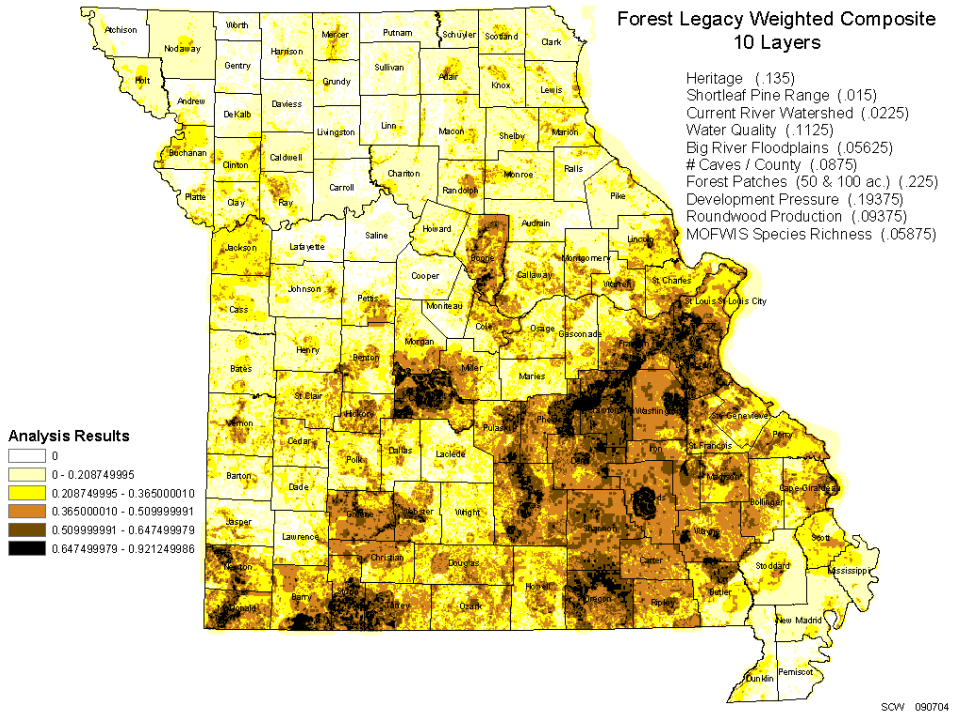


The Forest Legacy subcommittee then weighted the criteria to reflect the relative importance of each criteria and to better balance the threats with the values. Each committee member had a total of 100 points to divide among the selected criteria based on their view of the importance each criteria has in defining important forest values, uses and threats. The most important criteria received the highest number of points. The weighted values from each committee member were averaged to produce the weights for each criteria. This was then presented at the public meetings for additional input and re-weighted to incorporate public input. Table 3 lists the criteria and final weights. A map representing the weighted analysis follows with the final weights of the criteria noted.

Table 3 – Criteria Weights

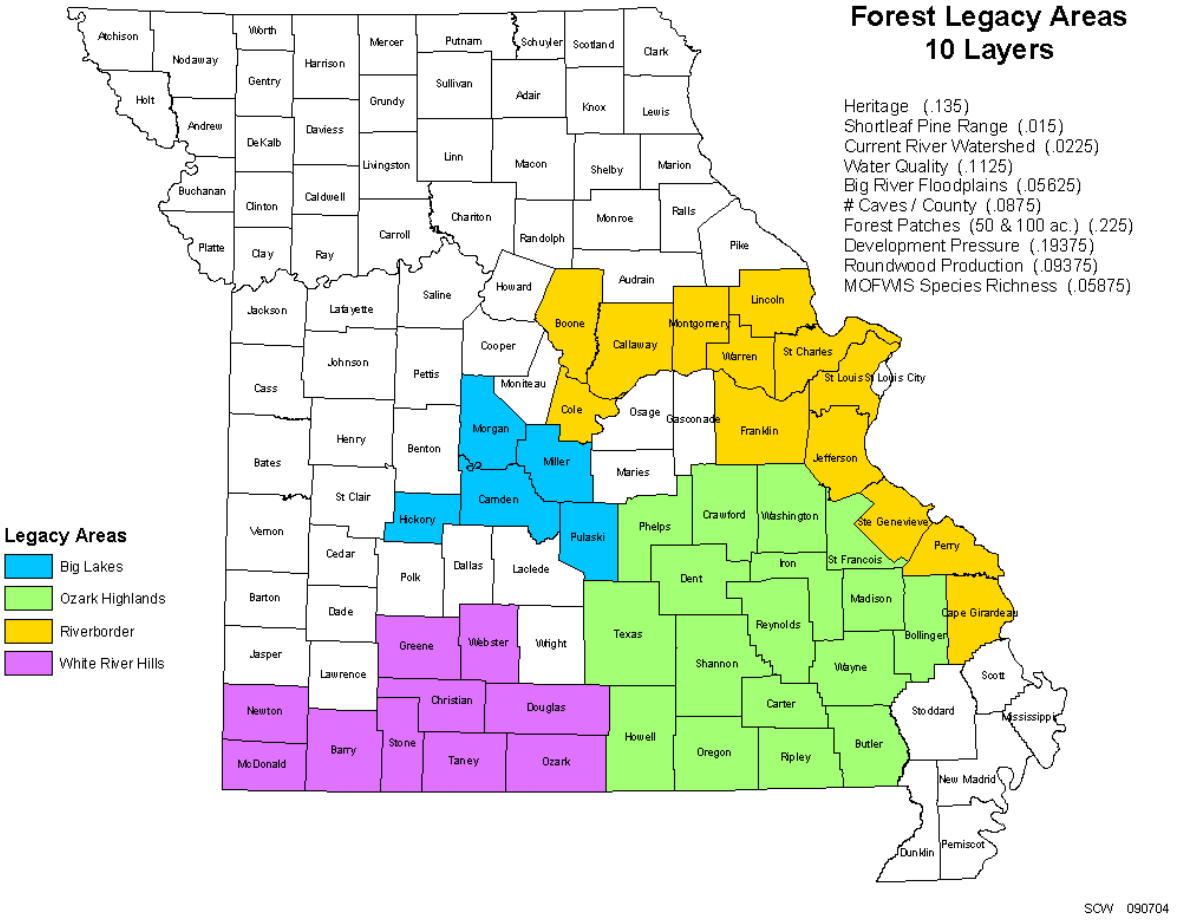
Criteria	Weight (%)
Forest tract size	22.5
Development pressure	19.4
T & E Species	13.5
Water quality	11.3
Roundwood production	9.4
Karst features	8.8
Species richness	5.9
Big Rivers/bottomland forests	5.6
Current River watershed	2.3
Shortleaf pine native range	1.5

Map 14 – Weighted Analysis



For purposes of this analysis, the existence of four GIS layers in any one location was considered to have significant forest values and threats to be considered for inclusion in a Forest Legacy Area. The Forest Legacy subcommittee had earlier agreed to expand the FLA's to county boundaries, so counties with a majority of their land base containing four or more criteria were designated as potential Forest Legacy Areas. The proposed Forest Legacy Areas were then divided into four distinct FLA's based on the unique resources, values, uses and threats in each FLA. The four proposed FLA's are designated as the Ozark Highlands, White River Hills, Big Lakes and Riverborder as represented on the following map:

Map 15 – Proposed Forest Legacy Areas



FOREST LEGACY AREA DESCRIPTIONS

Ozark Highlands Forest Legacy Area (Bollinger, Butler, Carter, Crawford, Dent, Howell, Iron, Madison, Oregon, Phelps, Reynolds, Ripley, St. Francois, Shannon, Texas, Washington, and Wayne Counties)

Description and Special Values:
The proposed Ozark Highlands FLA is so named because most of the area is contained within the Ozark Highland Section in the Missouri Ecological Classification System. The Ozark Highlands is a distinctive biogeographic region that includes most of southern Missouri. The exceptional length of geologic erosion, one of the longest in the United States, coupled with a central geographic location in North America and tremendous physiographic diversity, has created a region of unique ecosystems. Over 200 endemic species are present.

Throughout the Ozarks carbonate bedrock dominates, and karst features characterize the entire region. The highest and least dissected parts of the Ozarks are maintained as flat to gently rolling plains. These relatively droughty upland plains formerly supported prairies, savannas, and open woodlands. The plains give way to rolling hills closer to drainages, and then to the rugged, highly dissected hills and breaks flanking major streams that geographically dominate the section. The streams cut through a variety of geologic formations, creating multifarious landform, soil, and vegetation patterns. Residual soils in the hills are deep, rocky, and highly weathered, and they formerly supported oak and oak-pine woodlands and forest. Areas of shallow soils and bedrock exposure are common, but they vary in landscape position and extent. Rare and unique species are associated with the shallow-soil glades of the region. The streams of the Ozark Highlands are an outstanding and treasured resource. Most are spring-fed and carry very little suspended material. Because the region is karstic, many stream channels and valleys lose water to subterranean passageways, while others receive waters by seepage and springs, sometimes from areas far beyond their surface watershed. Many unique species are associated with Ozark streams, springs, caves, fens, and cliffs.

NOTE: For a technical discussion of this subject, see "Atlas of Missouri Ecoregions" by T.A. Nigh and W.A. Schroeder, 2002. Missouri Department of Conservation, Jefferson City, MO

This area contains significant amounts of most of the identified criteria including large blocks of contiguous forests, high species richness, much of the native range of shortleaf pine, many species of conservation concern, the Current River watershed and several other important watersheds, many important karst features including caves, springs and sinkholes, and important water resources. This area is also the most important portion of the state for wood industry, is important for forest-based recreation, and on the average, is growing in population at a faster rate than the statewide average. Although this area contains the largest percentage of public land ownership in the state, over eighty percent of the forest land is privately owned. Maintaining the connectivity of privately owned and managed forested tracts to the public forest lands in this area is important in sustaining the many values of this area. The FLP can be a valuable tool to assist with this task.

The Ozark Highlands might be described as the "wood basket" of Missouri. This is the most heavily forested region of the state, averaging approximately 72% forest cover for the seventeen counties, (US Forest Service, 1992). In addition, 31 percent of the states' timberland occurs in this area that only represents 14 percent of the land area of the state, (Spencer, Roussopoulos and Massengale, 1992). Nearly one-half of the States' primary sawmills are found in this portion of the state. Public forest land ownership is also high in this region, accounting for approximately 19 percent of the land base, (15% Federal and 4% State), as compared to approximately 3.5 percent Federal and 1 percent State ownership statewide. This area is characterized by small communities with forest industry and agrarian based economies. Forest-based recreation is high here, due not only to the heavy forest cover, but also to the high public ownership as well as local tradition and culture. This supports a strong tourism industry in this area. Many of the States' most pristine waters are also found in this portion of the state, including the Current and Eleven Point Rivers which are both included in the National Scenic Riverways system.

Trends over the past few decades indicate that increasing amounts of the land base is being subdivided and owned by a greater number of individual landowners. Although many own the land for serenity, escape or outdoor recreation, many others view this land as an investment. Increasing amounts are being subdivided and sold for profit, adding to the fragmentation of this important block of contiguous forest land. The relatively contiguous forests of the Ozark Highlands are not only important locally, but also nationally and internationally.

The area is geographically situated at or near the confluence of the eastern hardwoods, the southern pine forests, the northern plains and the western prairies. In addition, a portion of this area has developed over igneous parent material, adding to the diverse and unique ecosystems found in here. A portion of this area is identified as critical habitat for many neotropical migrant birds. The clear rivers and streams are also home to many of the States' species of concern. It is critical that this area remain heavily forested and that those forests are properly managed for the long-term sustainability of both the important wood industry and for the conservation of the many important habitats and ecosystems.

Although the threat of direct conversion to non-forest uses is lower here than in many other parts of the state, it does exist due to the relatively low cost of land and high value of timber. Much of the growth in this area has occurred outside of incorporated areas, causing the clearing and conversion of thousands of acres of forest land over the past decade. The continuation of little or no forest management, high grading, over-cutting and lack of the use of proper B.M.P.'s continues to threaten the long-term sustainability of the forest resource in this area. Bringing more of the privately owned land under forest management provided through state and federal programs such as the Forest Legacy Program will help to address this. Public attitudes regarding private ownership rights are very high in this portion of the state, again, making a voluntary program such as the FLP a viable alternative for interested landowners here.

Priorities for the FLP in this area include the conservation of large blocks of contiguous forest especially where connectivity is provided between public lands and other protected private lands, protection of karst features and watersheds, protection of critical habitat for species of concern, and protection of natural features. Projects that emphasize working forests should receive priority in this FLA due to the importance of the wood industry in this area.

This proposed FLA was selected due to the presence of most of the established eligibility criteria. Most important in this FLA is the presence of large tracts of contiguous forest cover, the economic dependence on a viable wood industry, the Current River watershed, shortleaf pine native range, numerous species of conservation concern, and karst features. Conversion pressure is lower here than in the other FLA's but is significant in portions of the area. Relatively low land values and high timber values have led to land speculation, fragmentation and conversion here. Water quality is not as great a concern except where associated with karst features and several of the aquatic species of concern. Public recreation opportunities are high in this area, so recreation access is not an important consideration here unless is can serve to enhance existing opportunities on other managed lands. Aesthetics were not used as eligibility criteria, but aesthetic amenities may be important in portions of this area and will add value to conservation easements.

Public participation in this proposed FLA, included a public meeting held in Salem, Missouri on April 5, 2004. In addition, numerous written comments were received from the public in this proposed FLA. Some public comments were received in response to information about the FLA that was provided at a regional conservation forum and in an article included in the Forestkeeper newsletter, *The Monitor*. A meeting was held with State Representative J.C. Kuessner regarding the Forest Legacy Program and included a discussion of the proposed Ozark Highland FLA. A meeting of the Forestry Caucus of the Missouri legislature was also held in Shannon County. This meeting included information on the FLP and discussion of all the proposed FLA's. Finally, individual members of the Forest Legacy sub-committee discussed the program and the proposed FLA's with associates and members of the general public. All concerns raised during the public participation process were addressed to the satisfaction of those who presented the concerns.

Means for Protection:

Due to concerns about additional government ownership in this area and a strong tradition of sovereign landowner rights, full-fee acquisition will not be a viable option for protection in this area. Conservation easements will be utilized to acquire development rights. Easements should prohibit the subdivision of forested lands covered under them. Easements should also prohibit clearing for utility easements that will require clearing of any forested acres that exceed the maximum of 5% of the total area of the easement in compatible use. Livestock grazing should also be prohibited in all conservation easements. Easements that provide for long-term forest management will receive priority due to the importance of the forest resources and the wood industry in this area. Timber management rights retained by the landowner will require the use of forestry BMP's, and allow harvesting only under the supervision of a professional forester as prescribed in an approved forest stewardship plan. Although access rights will not be an absolute requirement, easements that provide access rights, especially where connectivity is provided between other managed lands, will receive priority for program participation. Karst features are common in this area and many of these features are associated with habitat for species of conservation concern and/or are associated with the unique natural communities found here. Protection of valuable karst features will also be a priority here and will be accomplished through the use of buffers with harvest limitations or restrictions (the size and/or width will be prescribed in the Stewardship plan), and mandatory B.M.P.'s. Tracts that contain riparian sections or important watershed areas of the Current or Eleven Point Rivers will receive special consideration. All these values will be protected through the acquisition of easements.
The public benefits associated with protection of forested tracts in this area include maintenance

of the largest area of contiguous forest cover in the oak-hickory forest type in the mid-west. This is an important area for many species of neo-tropical migrant birds. Many of the unique and endemic species and communities of this portion of the Ozarks are dependent on healthy forest ecosystems so the protection of contiguous forest cover will help to provide protection and even enhancement of habitat for endemic species as well as species of conservation concern. Active forest management is paramount to maintaining long-term forest health in this area and it will also provide associated benefits by supporting the economically important wood industry of this area. Outdoor recreation opportunities may be enhanced where easements provide for public access or connectivity between other publicly owned or managed tracts.

All conservation easements acquired through the FLP will be held and monitored by the Missouri Department of Conservation.

Managed Lands within the FLA:
There are over 1.4 million acres of Federal and State owned land in this FLA including the Mark Twain National Forest, Ozark National Scenic Riverways and over 320,000 acres of State conservation areas. This includes everything from 1 acre river accesses to 40,000 acre State Forests (Conservation Areas). (Missouri Conservation Atlas, 2001). There are numerous State Natural Areas on public and private land throughout this FLA. The States' two largest private forest ownerships (Pioneer Forest now L.A.D. Foundation, and Powell Lumber recently sold to Current River Pole Company) are also included in this area.

All conservation easements acquired through the FLP will be held and monitored by the Missouri Department of Conservation under the State Grant Option.

Conversion Pressure
Nine of the 17 counties in this FLA are growing at a faster rate than the states average of 9.3%. Four other counties are growing at or slightly slower than the state average. One county, (Iron), experienced a slight loss in population and Reynolds County had only a slight population increase. The average percent population growth in this FLA was 11.3% compared to the state average of 9.3%. Relatively low land values and increasing timber values have increased land speculation and "cut and run" timber harvesting. Cut over lands are often converted to cattle operations or subdivided and sold in smaller parcels for recreational use or home sites. Tourism associated with the major rivers and public forest land is high in this FLA. Many of the landowners are absentee and live in St. Louis, Kansas City and other large towns both in and outside of Missouri so their numbers are not reflected in population trends, but they certainly have a major impact on the use and conversion of forest land in this area. Low land prices and cost of living coupled with the scenic beauty of this region will contribute to maintaining the high growth rate in this FLA.

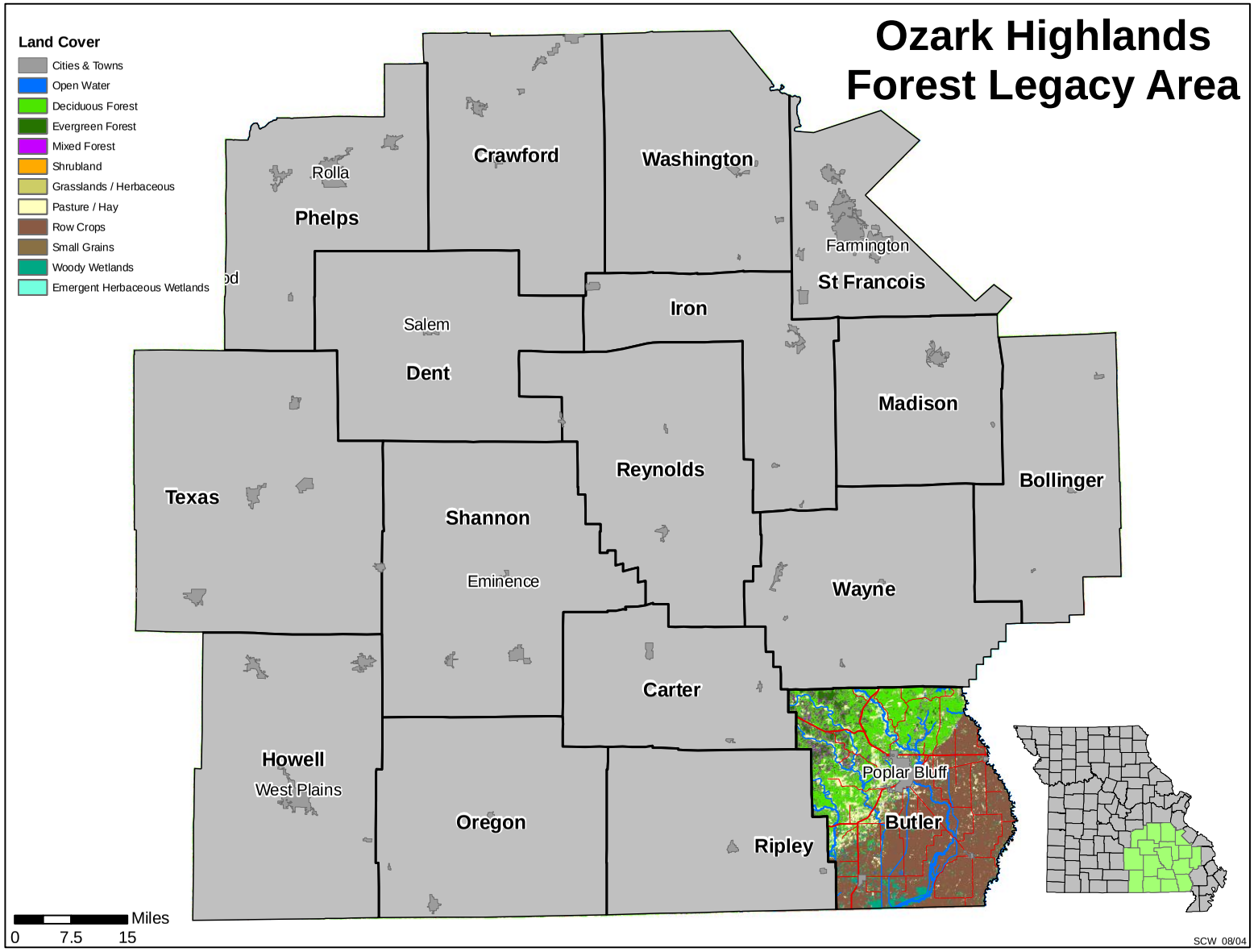
Table 4 – Population Change in the Ozark Highlands FLA

County	% Pop Change	County	% Pop Change
Bollinger	13.3	Phelps	13.0
Butler	5.4	Reynolds	0.4
Carter	7.7	Ripley	9.8
Crawford	18.9	St. Francois	13.8
Dent	8.9	Shannon	9.3
Howell	18.4	Texas	7.1
Iron	-0.3	Washington	14.5
Madison	6.0	Wayne	14.9
Oregon	9.2	**FLA Average**	**11.3**

Source: Missouri Population and Components of Change, 1990-2000 By County With State Totals, 2002. Office of Social and Economic Data Analysis, University of Missouri Extension, Columbia, MO.

Goals and Objectives for the Ozark Highlands FLA

- Maintain large blocks of contiguous forest cover particularly where linked to public or protected lands.
- Protect the Current River watershed (National Scenic Riverway) and the watersheds of other major rivers and streams, from degradation and forest loss.
- Maintain forest cover to protect karst and ground water supplies
- Maintain a sustainable timber supply to support forest industry and local economies.
- Protect unique natural features and T&E species of this area


Ozark Highlands
Forest Legacy Area
Land Cover
Cities & Towns
Open Water
Deciduous Forest
Evergreen Forest
Mixed Forest
Shrubland
Grasslands / Herbaceous
Pasture / Hay
Row Crops
Small Grains
Woody Wetlands
Emergent Herbaceous Wetlands
Crawford
Washington
Rolla
Phelps
Farmington
St Francois
Iron
Salem
Dent
Madison
Bollinger
Reynolds
Texas
Shannon
Eminence
Wayne
Carter
Howell
West Plains
Poplar Bluff
Butler
Oregon
Ripley
Miles
0 7.5 15
SCW 08/04

White River Hills Forest Legacy Area (Barry, Christian, Douglas, Greene, McDonald, Newton, Ozark, Stone, Taney, and Webster Counties)

Description and Special Values:
The proposed White River Hills Forest Legacy Area is located in southwestern Missouri. It lies primarily in the White River Hills Subsection of the Missouri Ecological Classification System, although a portion, Greene and Webster Counties is found in the Springfield Plains Subsection. This area is characterized by deeply dissected portions of the White River drainage. It includes Table Rock, Taneycomo, Bull Shoals and North Fork Lakes, all reservoirs on the White River. Steep slopes, narrow ridges, and narrow valley bottoms prevail throughout. Soils are rocky and thin over carbonate bedrock. High, rolling divides occur on uplands farthest from the major streams. Areas of rugged dolomite knobs are also characteristic. Local karst, losing streams, and large springs are characteristic. Presettlement vegetation was dominated by extensive dolomite glades and woodland complexes, oak woodland and oak-pine woodland and forest. Dolomite glades, the most extensive in Missouri, support numerous rare or endemic species. Urbanization pressures are great around all of the large lakes as well as around the Springfield to Branson corridor.

Historically, the White River Hills dolomite glade communities supported a wide variety of unique and endemic plants. The glades graded into open-oak savannas and woodlands. Low slopes and bottoms were forested in oak and mixed deciduous hardwood species, and cane thickets or "breaks" were common in bottoms. Some oak-pine forest and woodland occurred on high cherty ridgetops, especially in the eastern half of this area.

NOTE: For a technical discussion of this subject, see "Atlas of Missouri Ecoregions" by T.A. Nigh and W.A. Schroeder, 2002. Missouri Department of Conservation, Jefferson City, MO

The White River Hills FLA is approximately 43 percent forested, with about 13% of the forest land in Federal ownership and 1.5% of the forest land in State ownership, (Spencer, Roussopoulos and Massengale, 1992). Forest industry is not as significant here as in the remainder of the Ozark Highlands, but is important in communities near portions of the Mark Twain National Forest. Much of the States' eastern red cedar industry is found in this area. Tourism associated with the many lakes and the Branson area is a major contributor to the local economy. Several of the counties included in this proposed FLA have been among the fastest growing counties in the state for the past two decades due in a large part to the flourishing tourism industry. Economic opportunities related to the flourishing tourism in this area have greatly increased land values and land speculation. A lot of large properties that were once ranches or farms are being subdivided and developed. Smaller, five to forty acre tracts are being sold and converted into single family ranchettes throughout this area. The James River is one of the most threatened waterways in the state due to runoff of chemicals from rapidly expanding urban areas and sedimentation from the high level of land clearing and development. The James River Basin Partnership was created to address many of these problems. Stewardship assistance has been targeted in this area with a focus on planning and riparian protection. The FLP will assist in addressing the rapid development in the area.

The most important eligibility criteria found in this proposed FLA are the high conversion pressure, the presence of large tracts of forest land, water quality and watershed protection and protection of species of concern. Forests in this area are naturally interspersed with grasslands, savannas and glades. Development is associated with surface water features and has seriously threatened water quality here. Heavy tourism adds not only to the water quality concerns but has also strained water supplies, lowering the water table. Forest protection, enhancement and management are key to addressing most of these issues. Some forest industry is found in this FLA, with the most significant being the eastern redcedar production in the eastern portion. Public recreation opportunities are high in this area, so recreation access is not an important consideration here unless is can serve to enhance existing opportunities on other managed lands. Aesthetics were not used as eligibility criteria, but aesthetic amenities may be important in portions of this area and will add value to conservation easements.

Public participation in this proposed FLA, included a public meeting held in Springfield, Missouri on April 1, 2004. In addition, numerous written comments were received from the public in this proposed FLA. Some public comments were received in response to information about the FLA that was provided at a regional conservation forum in Springfield and in an article included in the Forestkeeper newsletter, *The Monitor*. Several phone and written inquiries were also received and addressed. All concerns raised during the public participation process were addressed to the satisfaction of those who presented the concerns.

Means for Protection:
Due to the relatively high land values in this area and an adequate amount of public land ownership, full-fee acquisition will not be pursued in this area. Conservation easements will be utilized to acquire development rights. Although access rights will not be an absolute requirement, easements that provide access rights, especially where connectivity is provided between other managed lands, will receive priority for program participation. This is particularly important where public recreation opportunities are linked to the strong tourism of this area. Due to the heavy amount of commercial development in this area, easements should require that any existing commercial signs or billboards be removed as soon as possible as prescribed under any contracts or other obligations related to those signs. The erection of new commercial signs or billboards will be prohibited. Easements should prohibit the subdivision of forested lands covered under them. Easements should also prohibit clearing for utility easements that will require clearing of any forested acres that exceed the maximum of 5% of the total area of the easement in compatible use. Livestock grazing should also be prohibited in all conservation easements. Karst features are common in this area with many being associated with habitat for species of conservation concern such as the Indiana bat and the Ozark cavefish. Protection of valuable karst features will be an important consideration for protection here and will be accomplished through the use of buffers with harvest limitations or restrictions (the size and/or width will be prescribed in the Stewardship plan), and mandatory B.M.P.'s. All these values will be protected through the acquisition of conservation easements.

The public benefits associated with FLP participation in this area include the protection and enhancement of limited forest cover. Protection and management of forests here will help to protect the areas important and threatened water resources. Economic development associated with the growing tourism in this area is placing huge demands on the water supply. This is

having impacts on both surface and ground water supplies. Riparian reforestation, forest protection, enhancement and management, and forest stewardship planning are all identified needs in this area. The FLP will help to support these local priorities. Outdoor recreation opportunities may be enhanced where easements provide for public access or connectivity between other publicly owned or managed tracts.

All conservation easements will be held and monitored by the Missouri Department of conservation under the State Grant Option of the FLP.

Managed Lands within the FLA:
This FLA contains considerable public lands including over 200,000 acres of the Mark Twain National Forest, nearly 25,000 acres of land owned by the US Corps of Engineers and managed by the Missouri Department of Conservation, and over 46,000 acres contained in approximately 83 separate areas owned and managed by the Missouri Department of Conservation. These areas include small river accesses and towersites, natural areas, two cold water trout hatcheries, lakes and many Conservation Areas ranging from a 100 acres to nearly 8,000 acres in size. (Missouri Conservation Atlas, 2001). There are also several State Parks in this region, including Table Rock State Park just outside of Branson. Public acquisition of lands will be limited in this area due to escalating land prices and the high amount of public land already found here.

Conversion Pressure
All ten of the counties included in this FLA are growing at faster or significantly faster rates than the state average. This region is the fastest growing region in the state (over 2 ½ times faster than the state average), and contains the three fastest growing counties and five of the ten fastest growing counties in the state. This trend began in the late 1980's and is expected to continue well into the future. A booming tourism industry centered on Branson and Table Rock Lake attracts an additional 5-6 million visitors to this region annually. Land values have risen drastically over the past decade as continued speculation and developments feed on this tourist trade. Many large forested tracts are being sold and subdivided for development, home sites, recreation and retirement properties.

Table 5 - Population Change in the White River Hills FLA

County	**% Pop Change**	**County**	**% Pop Change**
Barry	23.5	Ozark	11.0
Christian	66.3	Stone	50.2
Douglas	10.2	Taney	55.3
Greene	15.6	Webster	30.7
McDonald	28.0	**FLA Average**	**25.5**
Newton	18.4		

Source: Missouri Population and Components of Change, 1990-2000 By County With State Totals, 2002. Office of Social and Economic Data Analysis, University of Missouri Extension, Columbia, MO.

Goals and Objectives for the White River Balds FLA:

- Maintain or increase large blocks of contiguous forest cover where possible
- Protect the White River and James River watersheds and basin from degradation and forest loss associated with urban expansion and recreational development.
- Provide for protected forested green space associated with tourism development for its scenic values
- Maintain forest cover to protect karst and ground water supplies. Ground water supply is a critical issue in this region due to the geology and high public pressure for additional water supply. Several large reservoirs are also utilized for water supply here.
- Maintain contiguous forest cover linked to public lands
- Maintain a sustainable timber supply to support forest industry and local economies, especially in the eastern portion of this FLA
- Protect unique natural features and T&E species of this area

White River Hills Forest Legacy Area